

# The Chemical Age

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## Notes and Comments

### The British Industries Fair

THE British Industries Fair opened on Monday in far more cheerful circumstances than have obtained for many years, and industry generally has been inspired by the optimistic note struck by the Duke of York in his speech at the Mansion House banquet in celebration of the opening of the Fair on Monday night. This year's Fair, in its increased size and its infinite variety of exhibits, reflects a welcome change in outlook. Both in London and in Birmingham the Fair is larger than ever. The chemical section, at Olympia, is again under the auspices of the Association of British Chemical Manufacturers and affords evidence of a determination on the part of many firms in the industry to take every advantage of the signs of revival which are increasingly apparent. The direct results of exhibiting at the Fair cannot be found in a single balance sheet or in the returns of a single year. In difficult years manufacturers have demonstrated their faith by supporting the Fair even with the prospect of loss, and have persisted in that good husbandry of industry which consists of studying market changes and providing for them with as much care for the high reputation of British products as for the necessity to sell cheaply in a world insisting on cheapness.

The result is that at the moment when the turn for the better seems at hand manufacturers of every class are ready to cater for growing demands on thoroughly up-to-date lines. If the Fair has done nothing else it has served a useful purpose in developing manufacturing enterprise on highly progressive lines. Exhibitors generally have recognised that only the best that modern inventiveness can produce is worth while putting in this "shop-window." But it has done more than that—it has constituted such a world-wide advertisement of and interest in British products that the Fair now commands as much attention overseas as any similar trade effort in any country.

### Our Art of Dining Off Noise

A FREQUENT diner out, overcome by the impossibility of rational talk and music going on together, has been inspired to send us the following salutary protest. However much Sir John Simon may urge disarmament and peace upon the world, the public asks for noise. Government, under the guise of the B.B.C., sets up the tallest of masts to spread it everywhere. Mr. Shaw would even have it accented. The making of noise, in fact, is now man's ordered exer-

cise: only monkeys and parrots are his rivals. More and more eye-noise is being added to ear-noise: soon every surface will be either neonized or posterized. Many would seem to be unable to work without a background of noise, probably because much of our work is but its reflexion.

The worst offenders of all are those societies who, to make noise of themselves in the world outside, entertain at dinner and advisedly and knowingly allow what might be most delightful opportunities of pleasing, quiet concourse to be spoilt by an expensive machine-made noise, which diners make a point of talking down: whence pandemonium. The music makers are insulted and talking against them is a most painful, gymnastic feat. Let us at least agree to musical disarmament at dinners. Also, we need to construct halls of silence, in which we can converse with some ease and pleasure. Halls exist in which this is possible. Of what use are colloid chemists and chemical engineers, if they cannot devise some form of froth to stay noise—if they do not help us to dine together with better effect and real pleasure? Another form of noise, the after dinner speech, is also in need of scientific regulation.

### Heat Transmission Problems

IN the present state of knowledge it is difficult to predict accurately the degree of heat transmission that is possible in any given circumstances. Those who have been faced with such problems, except of the very simplest nature, know how difficult it is to obtain reliable information, and even if reference is made to original papers there is the task of sifting and comparing the data which are given, and sometimes still greater trouble in adapting it to the required conditions. Those who were able to hear Professor C. H. Lander at the Institution of Chemical Engineers, on February 16, were particularly fortunate, for Professor Lander dealt with modern methods of attacking heat transmission problems with a very sane outlook. The results of experimental investigations have already been brought together in accessible form by Dr. Margaret Fishenden and Mr. O. A. Saunders ("The Calculation of Heat Transmission," H.M. Stationery Office, 1932) where facts have been interpreted and compared so far as feasible in the light of the fundamental principles of radiation, conduction and convection. It is nevertheless evident that there is room for much further experimental work to be done, partly on account of the difficulty of defining conditions and partly owing

to the fact that experiments already completed are far from covering the effects of all possible factors on heat transmission.

The principle of similarity, or the dimensional method of analysis, which has been employed for correlating experimental data or convection, has been known to physicists for a long time, but its practical value was not fully realised until Lord Rayleigh in 1915 pointed out how useful it could be in the study of new problems. The principle expresses the self-evident truth that natural phenomena go their way independently of the man-made units used to measure them. The value of the principle is that it replaces a larger number of individual variables by a smaller number of groups, the influence of which must subsequently be investigated by experiment or otherwise. In practice it is necessary to limit the application of the principle to systems of fixed shape and fixed impressed distributions of temperature, velocity, etc. The reason for this restriction is that an unlimited number of dimensionless groups can be formed from ratios of lengths in any two directions, or ratios of velocities or temperatures at any two points, and unless these dimensionless ratios are fixed, the total number of variable dimensionless groups becomes so great that the principle cannot be usefully applied. The essence of the application of the principle to any given problem lies in deciding which variables to include and which units to take as fundamental. The variables must include all those which can affect the problem in question independently. How far the conclusions are found to be true in practice depends upon how far the assumptions made in selecting the variables and in the expression of the dimensions are correct. Departure from perfect agreement may be due not only to experimental error but also to failure in taking all possible variable factor into account when applying the principle.

### Autumn Leaves and Berries

JAPAN competes with Europe in chemistry as well as in cotton. In a recent editorial (THE CHEMICAL AGE, December 16, 1933), attention was called to the disinterment of Kryptoxanthol, the first discovered monohydroxy-carotene, a derivative of  $\beta$ -Carotene, from Cape Gooseberry capsules. Karrer now reports that this carotenoid had been previously separated in Japan from *Carica Papaya* but misdescribed as a diol. In the current "Berichte," Kuhn and Grundmann describe a new, isomeric copper-red Rubixanthol, a derivative of  $\gamma$ -Carotene, which they have separated from the fruits of *Rosa rubinosa*, together with Lycopene and carotenes and a paraffin,  $C_{31}H_{64}$ . Lutein-diol, the xanthophyll in green leaves and egg-yolk, it may be added, is a derivative of  $\alpha$ -Carotene, which is also the dominant carotene in all foliage, especially spinach. It is probable that Rubixanthol has only one closed loop and that the one hydroxyl is present in this—as it has no effect on A-starved animals.

The colouring matters in autumn leaves have often been the subject of a study. In a recent, interesting note ("Helvetica"), Karrer and Walker report results they have obtained with this last year's foliage. Apparently, the carotene and xanthophyll disappear, by oxidation, in advance even of chlorophyll, the former first. Oily substances are present in large

proportion in the yellowed foliage. They have not succeeded in isolating crystalline products but are opposed to the view that etherified compounds are present. Further advance in correlating the carotenoids with their oxidation products is to be found in a recent account by Kuhn and Winterstein of *Picrotoxin*, the colourless bitter stuff present in Saffron, together with its main component Crocin, Lycopene,  $\beta$ - and  $\gamma$ -Carotene and Zeaxanthadiol. They picture it as formed from the two loops dissected away by oxidation from the ends of a  $C_{40}$ -carotenoid, protocrocin, crocin being formed from the chain uniting these.

Kuhn and Wagner-Jauregg score one more goal for the minute constituent of milk, Lactoflavin, (THE CHEMICAL AGE, December 16, 1933) in showing it to be the analogue in behaviour of methylene blue—a "fencer," prepared to aid either reduction or oxidation. Hence perhaps, in part, its vitaminic ( $B_2$ ) value. These phytochemists are terribly prying fellows: their curiosity is insatiable, only excelled by their technical ability.

### The Willard Gibbs Medallist

FOR his discovery of "heavy water," Professor Harold C. Urey, of Columbia University, has been awarded the Willard Gibbs Medal of the Chicago Section of the American Chemical Society. He is, as yet, the youngest man ever to receive this honour. No scientific accomplishment of the present day, it is said, has had so immediate and so widespread an influence on research programmes or has given rise to a more highly competitive race among men of science. Many research laboratories in the United States, England, Germany and France, have discarded other research activity to develop the field which has now been opened by Professor Urey.

The importance of the discovery of the heavy isotope of hydrogen and preparation of deuterium is now expected to be far greater than that of most of the elements, for in the list of substances fundamentally affecting life and action hydrogen is second only to carbon. Associated with Professor Urey in the discovery were Dr. George Murphy, of Columbia University, and Dr. F. G. Brickwedde, of the United States Bureau of Standards. Experiments are in progress to determine the influence of heavy water on biological processes and biologists are hopeful that the new isotope will aid in the study of many types of diseases. Research with heavy water is also going on in the fields of physics and nuclear chemistry, and findings of great significance are predicted. The commercial production of heavy water is also under way. Professor Urey has stated that there were two reasons for suspecting the existence of a heavier hydrogen atom. A study of the kinds of atomic nuclei led him and his colleagues to expect that there might be a hydrogen atom of atomic weight, two, one of atomic weight three, and a helium atom of atomic weight five. There was also a discrepancy in the atomic weights, pointed out by Professor R. T. Birge, of the University of California, and Dr. D. H. Mentzel, of Harvard Observatory, which indicated that a hydrogen atom of higher atomic weight might be expected, but only in the exceedingly low concentration of about one part in 4,500. Hence some method of concentration was necessary in order to detect the heavier hydrogen and prove its existence.

## The Institution of Chemical Engineers

### Twelfth Annual Corporate Meeting

THE twelfth annual corporate meeting and annual dinner of the Institution of Chemical Engineers was held at the Hotel Victoria, London, on February 16, the president, Viscount Leverhulme, being in the chair. The president referred to the great loss the Institution had suffered by the deaths of Sir Frederic Nathan and Professor W. E. Gibbs, and acknowledged the support which he had received from all members of the Council during his second year of office. The Institution, he said, was one of the youngest of its kind, but it was in a healthy condition and showed all the signs of vitality and growth which were associated with the young. That was reflected in the membership figures, which were 661 in 1930, 700 in 1931, 726 in 1932, and 760 in 1933.

#### The Annual Report

The Council's annual report stated that the year had been marked by great activity in the appointments bureau. A greater number of vacancies had been notified than in recent years, and as a result of the prevailing conditions a larger number of suitable candidates had been available, while prospective employers had been more exacting than usual in their methods of selection. A high proportion of the vacancies had been filled by members, for many of the inquiries had not been confined to the bureau.

Arrangements were now in hand for the organisation of a chemical engineering congress. The project was originally discussed by an informal committee under the chairmanship of Sir Frederic Nathan, and after matters had progressed it was felt that the organisation of such a congress of an international character could best be undertaken under the aegis of the World Power Conference. The congress will therefore be held as a sectional meeting of the World Power Conference; the official date, however, has not yet been fixed.

The Council is taking steps to compile an "Index of Experience" to cover the whole range of chemical engineering experience of corporate members of the Institution. The index, which will be of assistance in answering requests for expert help, will be a revision and extension of the register of consultants inaugurated some years ago. The necessary papers will shortly be sent to the members concerned.

Mr. H. W. CREMER, hon. secretary, presenting the report, said it reflected another year of all-round progress in the affairs of the Institution. There had been a continued steady increase in membership, but the Institution could also measure its progress in terms of the position it held in the scientific and industrial life of the country. There could be no doubt that it was steadily gaining in prestige and usefulness as it grew in years. As a qualifying body it maintained its high standard for admission; in the field of education it was increasingly useful in advising those desirous of entering the profession, and in disseminating through its scientific meet-

ings knowledge of a most valuable and varied kind. But one of the surest signs of its virility was afforded by the increasing number of requests for the Institution to be represented on committees of widespread national importance; and, such was the varied experience and standing of the members, there was always someone both qualified and willing to undertake such work. In fact, one of the most satisfying features was the ready response made by every member to any call which the Council might make on his time and experience. Sir Frederic Nathan, shortly before his death, completed a comprehensive and valuable memorandum setting out the development of the educational and examination policy of the Institution from the commencement; this document had proved of the greatest help in formulating plans for the future.

A list of books had been drawn up, primarily for the use of those studying for the associate-membership examinations, and a great deal of assistance could be afforded by members as a whole if they would communicate the titles of suitable new books, preferably under the appropriate classification as set out in the Memorandum on the Training of the Chemical Engineer. It was hoped that this list would be the first stage towards obtaining a comprehensive bibliography of chemical engineering literature for the use of members.

#### Officers and Council

The result of the ballot for the election of officers and members of Council was announced as follows:—President, Mr. W. Macnab; vice-presidents, Dr. H. Levinstein, Mr. H. Talbot; hon. secretary, Mr. H. W. Cremer; hon. treasurer, Mr. F. A. Greene; members of Council, Dr. W. R. Ormandy, Dr. A. J. V. Underwood, Mr. S. G. M. Ure and Mr. C. Chapman (associate member).

The Osborne Reynolds Medal, awarded for services to chemical engineering, was presented to Mr. H. W. Cremer, hon. secretary, for the year 1933.

Mr. CREMER, in his response, expressed his gratitude to the officers and members of Council, from the president downwards, for the help they had afforded him; and particularly he paid tribute to the late Professor J. W. Hinchley (his predecessor), because in so many cases it had been left for him to reap where Professor Hinchley had sown.

The Moulton Medal for 1933 was awarded for the papers on "The Mechanical Properties of some Austenitic Stainless Steels at Low Temperatures," by E. W. Colbeck, W. E. MacGillivray and W. R. D. Manning; and "The Mechanical Properties of Metals at Low Temperatures, Part II, Non-Ferrous Materials," by E. W. Colbeck and W. E. MacGillivray.

The Junior Moulton Medal and Prize were presented to Dr. E. H. T. Hoblyn, for his paper on "The Solvent Extraction of Sulphur from Sicilian Ores."

## Chemical Engineering and the Edible Fat Industry

Lord LEVERHULME, in his presidential address on the edible fat industry, said that whereas the soap industry, with which he had dealt in his presidential address last year, had managed to exist for many centuries before the modern chemical engineer came on the scene, the edible fat industry was essentially the creation of the chemical engineer. Manufactured edible products included margarine, cooking fats, bakery fats and edible oils of various kinds. In this country the principal one was margarine. The connection between the soap trade and the edible fat trade lay in their using the same kind of raw materials, *i.e.*, glycerides. It was the advent of the margarine maker and his competition in the oil and fat market which had forced the soap maker to look for other possible sources of supply. In fact, had it not been for the edible fat industry, the soap manufacturer might have been able to jog along quite pleasantly without so much skilled attention from the chemical engineer.

The first margarine maker was the French chemist, Mège Mouriés, who made his discovery in the middle of last century. Just before the Franco-Prussian war of 1870, the shortage of butter had become so acute in many European countries that it had become almost a luxury. In France the shortage was particularly acute and the Government had looked around for an alternative to be used in the first instance for her army and navy. They had commissioned Mouriés to carry out experiments in the hope of finding a way of producing an alternative to butter, and in 1869 his work had reached such a stage that he obtained a concession to erect a factory near Paris. Lord Leverhulme discussed briefly the work of Mouriés, resulting from the realisation that if skimmed milk could be enriched by mixing it with an extraneous fat, a much less expensive product than butter could be obtained.

The method of manufacture in a modern margarine factory

was essentially the same as that used by Mouriés, the inventor having soon realised that the cow's udder part of the process was not required, since an efficient stirring gear would give an equally good creamy emulsion. The stages in margarine manufacture are (1) the preparation of the skimmed milk; (2) preparing and mixing the refined fats and oils; (3) churning or emulsifying the milk and fats to form a cream or emulsion containing a high percentage (75 per cent. to 85 per cent.) of fatty matter; (4) cooling and solidifying (*i.e.*, crystallising) the emulsion; (5) kneading the granular or crystalline margarine into a plastic substance; (6) adding, during the kneading, salt and other ingredients and (7) packing the product.

Considerable developments and improvements had, of course, been effected since the time of Mouriés. The supply of suitable raw materials had been greatly extended. In the making of modern plant and machinery wood had been largely eliminated and replaced by suitable metals or other materials to ensure bacteriological cleanliness. At the same time, the process had been improved in many of its technical details and was subjected to more scientific control. The main stages in the most up-to-date method of manufacture were illustrated by photographs of the plant used, most of them from the margarine factory at Bromborough, Cheshire.

With regard to raw materials, plantations of selected species of oil palms were competing with nature in the wild state and in the production of the oils from the fruits and seeds, and the old-fashioned hand methods of the natives—unaltered for centuries—had been replaced (where local conditions permitted) by special depericarping and nut-cracking machinery. In the treatment of the African palm oil, for instance, modern plants designed by chemical engineers had ousted the open fire and pot of the native cultivator; one of the modern mills for preparing palm oil and palm kernels, at Leverville, in the Belgian Congo, was illustrated.

#### Oil Extraction

The oil was extracted from nuts and seeds either by pressure or by solvent extraction, the agent in general use in the latter case being benzine. If the oil-bearing material had a relatively low percentage of oil, or if there were a poor demand for the oil cake (*i.e.*, the residue after crushing), it was frequently more economical to extract the oil by the solvent method, in which case less than 1 per cent. of oil was left in the cake. Solvent extraction was principally used for soya beans, but was often applied also to palm kernels, groundnuts, rape seed and some other materials.

Although solvent extraction had made great strides during the last 25 years, crushing was still the method principally used. Before the seeds were put into the press or solvent they had to be ground, and when pressure extraction was used they had also to be heated with boiling water or steam. Heat application and pressure were also used in the preparation of oils and fats from animal sources in order to obtain the higher grades of lard and beef fat required for edible purposes. The fatty tissues from which these fats were obtained must be used immediately after the killing of the animal, and this branch of the industry, therefore, had reached its highest development in the huge abattoirs of the United States, particularly in Chicago.

In the whaling industry there was the development of the floating factory, for the industry had to be adapted to fore-stall the rapid deterioration of the animal carcasses. The difference between Chicago and the Antarctic was that in the one case the animal was taken to the factory, and in the other the factory was taken to the animal.

#### Treatment of the Oil

The oil obtained had to be refined and in some cases hardened by hydrogenation; certain grades of some oils also required to be deodorised and possibly bleached before they could be used for edible purposes. Refining, in the broad sense of the word, generally included pre-treatment, neutralising, bleaching and deodorising. These processes were essentially fields of activity for the chemical engineer, as they demanded a knowledge of the chemistry and physics of oils and fats and of the materials best suited to the construction of the necessary plant. The chemical engineer must pay close attention to the way various metals were affected by the chemicals used in treating the fats, for it was proved con-

clusively that certain metals (even if present in the final oils and fats in quantities amounting to only a few parts per million) might act as catalysts for processes of deterioration. Some oils did not require pre-treatment before neutralisation; others contained substances which might interfere with neutralisation if not previously removed. The general method of removing such substances was by treatment with acid, coagulating substances or brine.

The process of neutralising consisted of removing the oil with a suitable quantity and quality of alkali to convert the free fatty acids into soap, which was then removed from the neutral oil either by filtration or by settling, the aqueous soap solution being subsequently drawn off. Many different chemicals were used for neutralising, such as caustic alkali, sodium carbonate and alkaline earth, the most widely used being caustic soda. The concentration in which it was used varied according to the type of oil, the percentage of free fatty acids and the preference of the individual refiner.

#### The Bleaching Process

When the soap solution—known as "soapstock"—had been separated from the neutral oil, and all traces of soap, suspended or partly dissolved, had been eliminated, the neutral oil was dried in vacuo and bleached by the addition of carbon or a bleaching earth which absorbed the colouring matter. The bleaching process was generally carried out at a rather higher temperature and was preferably conducted under a vacuum to avoid oxidation of the oil. When the process was completed, the oil was separated from the bleaching earth by filter presses. If the clear bleached oil required deodorising, it was given a further treatment in vacuum vessels, where steam was blown through the oil to carry away the odorous substances. This process was generally carried out at temperatures ranging from 160° to 200° C., and in a vacuum which might be as high as 4 to 5 millimetres absolute pressure. As oil at these temperatures was extremely susceptible to damage by oxidation, the care necessary to ensure that there was no air leakage in the plant demanded the highest skill of the chemical engineer.

The hydrogenation process, whereby soft oils and fats were rendered hard by the addition, in the presence of a catalyst, of one or more hydrogen atoms to each molecule of the oil, was important to the edible fat industry because its products had to be of solid consistency. By a judicious selection of the hardening conditions to be employed, as, for instance, the temperature, the pressure and the choice of a catalyst, oils could be converted into solid fats of any melting point and consistency required.

Speaking of the other products of the industry, Lord Leverhulme said that compound lard stood in the same relation to lard as margarine did to butter, and could be used for the same culinary purposes as lard. Like lard, it was 100 per cent. fat; and, curiously enough, just as margarine had attained its most extensive use in the principal butter producing countries such as Denmark, so compound lard, or "shortening," as it was often called, found its largest sale in the leading lard producing country, *i.e.*, the United States. It was made from a mixture of high melting fats and liquid oils, such as oleo stearine and highly hardened fat, combined with groundnut oil, cottonseed oil, soya bean oil or similar liquid oils. After the fat mixture had been melted, it was cooled on a revolving metal cylinder, chilled internally by brine or by the direct expansion of ammonia or some other refrigerant. The semi-crystallised fat which peeled off the cylinder in big sheets was beaten with air in a special aerating plant to make it into an opaque plastic product of lard-like appearance.

#### Confectionery Fats

Confectionery fats included compound lard and margarine of a type specially adapted for confectionery. When the fats were required for pastry making, tough consistency and high melting point were aimed at; while for sweetmeats, such as toffees, caramels and chocolate, a different type of fat was needed. As an alternative to the natural fat "cocoa butter," with its characteristic hard and "snappy" texture and low melting point, the edible fat manufacturer had discovered that certain other fats, by a process of simple refining or fractionating, could be converted into products which ful-

filled the same purpose. Their manufacture required an intimate knowledge of the physical nature and chemical constitution of the fats used, in order to yield a product which, when blended with other ingredients, such as sugar and cocoa, would solidify in the proper crystalline form and avoid such a segregation of crystals as was known amongst chocolate makers as "fat bloom."

With regard to cooking and salad oils, it was stated that compound lard was employed largely for cooking and frying, and many users preferred a liquid oil of the refined type, not always deodorised to the same extent as in the manufacture of margarine or compound lard. Most liquid oils were suitable for the purpose, although they differed in quality according to their susceptibility to oxidation when subjected to the high temperatures required for cooking or frying. To many people, salad oil was probably synonymous with olive oil, but very large quantities of other liquid oils, such as groundnut oil and cottonseed oil, were used for the same purpose. A good salad oil was required to remain clear even at fairly low temperatures, and if an oil contained too high a percentage of solid glycerides which would tend to crystallise out in cold weather, it had to be de-stearinised by storage at the same low temperatures as those met with during use, in order to crystallise out the higher melting glycerides. The glycerides were then removed by filtration.

Measurements of the nutritive qualities and digestibility of margarine and edible fats and of butter fat, lard and natural

oils, showed that their calorific values and percentages of digestibility compared favourably. For instance, a gramme of butter fat produced on the average 9,240 calories, while a typical margarine fat produced 9,440; typical figures for the digestibility of the fats were 97 per cent. in the case of butter fat and 97.4 per cent. in the case of margarine.

Until the researches of Sir Frederick Gowland Hopkins had set us all talking about vitamins, the margarine manufacturer could with justification claim that he had produced a foodstuff equal in nutritive value to butter. This had no longer held good, however, when it was found that the fat soluble vitamins, normally present in butter, namely, vitamins A and D, were absent from vegetable fat and present only in small traces in some of the animal fats used in the manufacture of margarine, notably oleo and beef suet. The challenge was taken up by the manufacturers; after some years of research, methods of attaining the desired end were worked out, and some six years ago margarine of the appropriate potency in respect of vitamins A and D was introduced on the market. At present many brands of this potency are manufactured, the consumption amounting to many hundreds of tons per week. Thus, in the final stages of the most up-to-date method of margarine manufacture we found the chemical engineer and the bio-chemist working as partners. It was a partnership which had before it many further fields to explore and conquer, and he had reason to hope that interesting and valuable results would be achieved in the future.

## Minister of Health at the Annual Dinner

Lord Leverhulme presided over a company of 250 members, ladies and guests at the annual dinner. Among those present were Sir E. Hilton Young (Minister of Health), Mr. F. D'Arcy Cooper, Lord Melchett, Dr. E. F. Armstrong, Professor H. E. Armstrong, Mr. W. A. S. Calder, Dr. J. T. Dunn, Mr. H. W. Cremer, Mr. F. A. Greene, Mr. H. Talbot, Mr. E. A. Alliott, Dr. G. W. Himus, Dr. L. A. Jordan, Dr. L. H. Lampitt, Professor C. H. Lander, Sir William Larke, Dr. R. Lessing, Mr. A. H. Lynn, Mr. W. Macnab, Professor G. T. Morgan, Mr. C. F. Mounsdon, Dr. W. R. Ormandy, Sir Joseph Petavel, Dr. R. H. Pickard, Mr. H. J. Pooley, Mr. J. Davidson Pratt, Mr. J. Arthur Reavell, Sir Robert Robertson, Mr. F. H. Rogers, Mr. J. F. Ronca, Dr. E. W. Smith, Sir Frank Smith, Professor J. F. Thorpe, Dr. A. J. V. Underwood, Mr. J. A. F. Wilkinson, Mr. H. T. Tizard and Mr. A. C. Cross, editor of *THE CHEMICAL AGE*.

Mr. W. A. S. CALDER proposed "His Majesty's Ministers" and coupled with the toast the name of Sir E. Hilton Young. He said that although the present Government would candidly acknowledge that the arrival of the millennium is still far distant, it must be agreed that our Government had done great things for the country.

Sir EDWARD HILTON YOUNG (Minister of Health), in response to the toast, said that at one time he had been offered the post of chemist to an optimistic company which believed it could extract soda from the deserts of Egypt, but he did not become the chemist to that company nor did the company extract any soda from the desert. Speaking of the activities of the Institution, Sir Edward said his duties as Minister of Health brought him closely into touch with many of them, and he specially mentioned the prevention of pollution of rivers. In the short period during which he had held office he had learned what a great deal in that connection had already been accomplished by the aid of science represented by the chemical engineer, in purifying the rivers.

### Good Consequence of a Great Evil

The Institution was one of the good consequences of a great evil, that great evil of the war, because it was established in consequence of the need which was then made manifest for such an organisation. Chemical engineers would welcome the recent advances made by the Government for the encouragement of the hydrogenation process for producing oil from coal. As a result of the interest taken by the Government there were being established large works at Billingham which would involve an expenditure of 2,500,000 and provide employment, directly and indirectly, for 12,000 hands.

Mr. F. D'ARCY COOPER, proposing "The Institution of Chemical Engineers," said he was associated with a company concerned with oils and fats and he knew how essential the chemical engineer was to industry to-day.

Lord LEVERHULME, in his response to the toast, expressed regret at the loss during the past year of Sir Frederic Nathan and Professor Gibbs, both of whom had rendered such great services to the Institution in particular and the chemical engineering profession in general. He contrasted the greater freedom to develop industry in the days of his father with those obtaining to-day although, in view of what Sir Hilton Young had said regarding the Alkali Inspectors, he hastened to add that he did not lay the restrictions at the door of the Ministry of Health. In this connection, also, he mentioned an incident in which his father had argued—and carried the day—that all the profits made during the previous year should be put back into the business and spent on advertising. He did not know, he said, what would happen to-day if it were suggested at a shareholders' meeting that such a course should be adopted and whether the requisite authority would be granted, but at any rate he suggested it was a tribute to the philosophy of the Victorian period which had enabled many of our leading industries to be established. Finally, Lord Leverhulme expressed his thanks to the Council and members of the Institution for the support they had given him during his two years of office as president. Remarking that he had made many friends, he mentioned the chemical engineering conference that is to be held in London in 1935, or 1936, and spoke with satisfaction of the fact that he had been invited to act as president of that Conference.

### Education of the Chemical Engineer

Mr. W. MACNAB proposed "Our Guests" and referred to the education of the chemical engineer, in which work the Institution was working in close touch with those colleges which had established chemical engineering courses. Recently he had been going through a number of papers sent in by students and graduates of the Institution and had been deeply impressed by their high character and the evidence shown of diligence and widespread research. Under the aegis of the Institution and the colleges, chemical engineers were being turned out who would be of the greatest service to the nation. Referring in this connection to the presence of many employers in the industry he expressed the hope that they would be able to find employment for the young chemical engineers. If these young men, on the one hand, would realise when they entered the factories that they did not know

everything, the employers on the other hand would also find out that these young men had a great deal of knowledge which would be of immense help in the industry. The toast was coupled with the name of Lord Melchett.

Lord MELCHETT, in response, said that the hydrogenation of coal was a special case of private enterprise being related to national policy. This was not a spasmodic thing or something that had occurred by chance. It was the result of long and arduous work and considerable expenditure and foresight on the part of the people who had been engaged in it. His father's interest in oil from coal went back more than a decade and it had been his desire to see oil from coal established as an industry in this country. That had been one of the factors which had caused his father to embark on the great experiment of Imperial Chemical Industries, Ltd., be-

cause he realised that Brunner Mond and Co. alone was not strong enough to handle the great problems that were coming up from time to time. He had felt that the industry must be in more comprehensive units in order to deal with these great national problems. Certainly in the chemical industry it had been shown to be necessary that it should be organised in larger units and one could only regret that other industries—perhaps because they had not had chemical engineers to help them—had not seen the light so soon or acted upon the new ideas so quickly.

The final toast of "The President" was proposed by Mr. J. ARTHUR REAVELL and was briefly responded to by Lord LEVERHULME, who asked the Institution to give to his successor—Mr. Macnab—the same support that had been given to himself.

## Heat Transmission Problems

### Professor Lander Addresses the Institution of Chemical Engineers

AT the commencement of his paper at the twelfth annual corporate meeting of the Institution of Chemical Engineers, held at the Hotel Victoria, London, on February 16, Professor C. H. Lander, D.Sc., M.Inst.C.E., said that no apology was needed for choosing a subject of such wide application as heat transmission. There are few chemical engineering processes in which heat does not play a part, and the regulation and control of heat flow can be a very important matter for the chemical engineer. Unhappily, by reason of the very nature of heat transfer processes, it is often difficult to bridge the gap between theory and practice, but it was none the less essential to seek law and order wherever possible. He pointed out that in endeavouring to analyse heat transmission the main trouble is that radiation, conduction and convection, which occur simultaneously, conform to entirely different laws. Further, these different processes, even when considered separately, are very complicated, and are affected by a large number of variable factors. For instance, although the laws of radiation from solid bodies are fairly well established, very little is yet known about the radiating properties of hot gases. Furnace designers and furnace engineers have certainly realised that luminous or sooty flames might give intense radiation, but until quite recently it was generally assumed that non-luminous flames and gases did not radiate.

#### Radiation and Furnace Design

The design of furnaces has in the past been almost entirely empirical, scientific principles having been only very sparingly applied. The problem of getting the heat where it is wanted in the furnace is a very difficult one, and there is scope for much further progress. About ten years ago a book was published by a Russian engineer, Groume-Grjimailo, who attempted to apply the principles of convection to several types of annealing and re-heating furnaces. Although the treatment was by no means complete, and the book not of great use to the furnace designer, it was an enterprising attempt to break into a difficult subject. There is no reason why furnaces should not be constructed according to definite scientific principles, providing the data required are ascertained once and for all by appropriate experiment. It is clear, however, that radiation, both from combustion gases and furnace walls, which was neglected in Groume-Grjimailo's analysis, must be taken into account.

Convection is fundamentally a very complicated process. Mathematical analysis of fluid motion has been confined mainly to non-viscous fluids, and in all cases the motion has been supposed to be streamline. In convection the problem is one of fluid flow combined with heat movement. It is known that the fluid very near a surface is either stationary or in streamline motion, and until recent years investigators have reduced the problem of convection to that of conduction across the so-called stationary layer. This, however, is only a convenient method of expressing experimentally determined coefficients, and is no advance towards a quantitative

theory of convection, since the thickness of the boundary layer can only be deduced by working backwards from the experimental coefficients. In 1930, Mr. O. A. Saunders gave a paper before the Junior Section of this Institution, entitled "Heat Transfer Calculations," in which he showed how a mass of scattered experimental data could be brought into manageable form by this method.

It is only for a few simple shapes, *i.e.*, cylinders and planes for natural convection, and flow across cylinders and planes and through tubes for forced convection, that there are enough experimental results to be correlated even with the help of the principle of similarity. But the effects of shape, which of course helps to determine the nature of the fluid motion around a body, may be so important that fuller and more systematic investigations are urgently needed.

#### Effect of Turbulence

It is known, of course, that the heat transfer between the internal surface of a tube and a gas flowing through it decreases as the diameter increases. For very large diameters it would be expected to approach a limiting value equal to the corresponding value for plane surfaces, but over the experimental range, the heat transfer for flow through a tube steadily decreases as the diameter increases, and at 1 ft. diameter, which is the limit of the experimental range, has already fallen 50 per cent. below the plane surface value.

It is generally agreed that turbulence aids heat transfer, and it has been found that devices inserted in a fluid stream to induce turbulence prior to its incidence on a surface increase the heat transfer coefficient. Reiher, Fishenden and Saunders ("The Calculation of Heat Transmission," pp. 130 and 136-7) found that the heat transfer between the external surface of a cylinder and a stream of air flowing at right angles to its axis at velocities of 6 to 15 ft. a second was about doubled by placing two rows of staggered tubes to windward. He obtained similar results with tube-bundles, in which, with staggered arrangements of 0.6 in. diameter tubes in rows respectively 0.8 in. and 1.1 in. apart, the third and subsequent rows gave much higher rates of heat transfer, tending to about 50 per cent. increase, although in the former arrangement there was a decrease of 14 per cent. from the first to the second row. In square formation, tubes of diameter 0.6 in. arranged in rows just over an inch apart, gave about 25 per cent. less in the second than in the first row, but in subsequent rows the transfer was about the same as in the first row.

Griffiths and Awbery ("Heat Transfer between Metal Pipes and a stream of Air," December 15, 1933) in a recent paper before the Institution of Mechanical Engineers, described measurements on banks of iron pipes of  $1\frac{29}{32}$  in. diameter. In the square formation, with parallel rows 3.2 in. apart, there was an increase in heat transfer from the first to the second row which rose steadily with the velocity to 31 per cent. for the highest velocity recorded, *i.e.*, 20 ft. a second.

There was no further increase in the third or later rows. With the square formation rotated through 45° with respect of the air stream, bringing it into staggered formation with parallel rows 2½ in. apart, the heat transfer increased successively from the first to the second, and from the second to the third row, after which it remained constant, at a value about 65 per cent. above that for the first row. The authors suggested that "the air was set in a definite state of eddy motion in the first layer, and that the second layer added to the general turbulence, the process being completed after the third layer." By making the air turbulent before it impinged on the tubes, the heat loss even in the first row was increased above the limiting value for a number of rows without artificial turbulence, but there was no further increase in subsequent rows.

### Streamline Surfaces

It may seem anomalous that, whereas heat transfer can be increased by promoting turbulence, it is also high for cylinders of streamline section. For instance, according to Hughes ("Phil. Mag.", 1916, 37, 118) a streamline cylinder with the air stream incident on the rounded end loses about 10 per cent. more heat than a circular cylinder of the same surface area. Further, when the streamline cylinder was turned round so that the air stream was incident on its pointed end, its heat loss was reduced by 30 per cent. This presumably is to be explained by the existence of a dead zone in the wake of a circular cylinder, whereas the air stream clings to the streamline section throughout its length. If the heat transfer for a streamline cylinder is compared with that of a circular cylinder of the same air resistance the difference is much more striking, the ratio being about 7 to 1. The theoretical relationship between heat loss and skin friction, which has been worked out by Reynolds, Prandtl and others, helps in the interpretation of these results. The heat loss is proportional to the skin friction, which if the air motion is everywhere streamline, is responsible for the entire resistance. On the other hand, when the motion is turbulent, energy is spent in setting up eddies and the total resistance is greater than the skin-frictional resistance. A cylinder of streamline section is designed to create a minimum amount of eddying, even when the velocity is much above the critical value; consequently the heat loss should be very nearly proportional to the total resistance, whereas for a circular cylinder the heat loss for the same resistance is much less.

### Effect of Roughness

The effect of roughness on heat transfer is another important practical consideration. Roughness could, of course, be regarded theoretically as a shape factor, but no experimenter has so far been ambitious enough to maintain geometrical similarity so perfect that the grade of the roughness was proportional to the linear dimensions. The frictional resistance of a surface can be greatly increased by roughening, but it is by no means certain that a corresponding increase in the heat transfer would follow; for very low velocities, indeed, roughness might even decrease heat transfer owing to the insulating effect of air trapped in the cavities.

Stanton, at the National Physical Laboratory, for forced convection in a brass tube of 1½ in. diameter with intersecting grooves 1/100 in. deep, obtained values more than twice those for a smooth tube under the same conditions, but some further experiments showed roughening the gills of an air-cooled internal combustion engine to have no appreciable effect. Again, Reiher found that a grooved tube gave less heat transfer at low velocities, and more at high velocities, than a smooth tube. Most experimenters have found the heat transfer to be higher between a rough than a smooth plane surface and a stream of air, but Ott obtained lower values for a rough surface than for a smooth one at velocities below 15 ft. a second, and higher values at velocities above 15 ft. a second.

### Points from the Discussion

Dr. S. G. BARKER (director, Woollen Industries Research Association) congratulated Professor Lander on the clearness with which he had expressed himself and upon his avoidance of much highbrow scientific language. On behalf of Dr.

M. C. Marsh (head of the Physics Department of the Research Association), he mentioned a striking example of the effect of roughness of surface on heat transfer, which Dr. Marsh had experienced when studying the flow of heat through fabrics. The heat transmission was measured when the fabric was in the form of a cylinder supported in the space between an inner hot cylinder and an outer cool one, all the surfaces having a common axis. As a matter of interest, on one occasion he had substituted a brass cylinder for the fabric, keeping the hot and cool surfaces at the same temperatures as before. The heat flow through the brass was 2.17 watts when polished and 3.50 watts when blackened, while that for a fabric of the same thickness (flannel) was 4.83 watts.

The larger heat flow in the case of the fabric as compared with the brass was somewhat puzzling at first. The conductivity of brass was 10-20 times that of flannel; therefore, the difference should have been the other way. Blackened brass was a close approach to a black body, and radiation was therefore not responsible. Further, the fabric was practically opaque to radiation and its air permeability was too low to allow any appreciable convection through interstices of the fabric. Therefore, Dr. Marsh had concluded that the larger heat flow in the case of the fabric was due to the better interchange of heat between the natural convection currents and its inner and outer surfaces compared with that occurring at the metal surfaces. Thus, the "roughness" effect more than overcame the decrease which should be brought about by the lower conductivity.

Dr. W. R. ORMANDY said it had been found from experience in one works that very slight variations in the conditions of furnace walls had had effects out of all proportion to what might be expected, due to variation in the flow of the gases. He looked forward to the continuation of the work at the Imperial College.

### Variation of Furnace Wall Conditions

Dr. MARGARET FISHENDEN, commenting on Dr. Ormandy's remarks, said that the work that was being done at the Imperial College of Science, on radiation from non-luminous gases at high temperature, was in many ways the most fascinating piece of work on heat transfer, not only on account of its very important practical applications, but more because of the very curious fact that, whilst everybody knew about the experiments on absorption made in the physical laboratory, until recently nobody had been quick enough to see the application to radiation from gases at high temperatures.

Professor LANDER recalled some experimental work he had carried out many years ago, of somewhat similar nature to that mentioned by Dr. Barker, in connection with the heat losses from steam pipe coverings, where the pipes were lagged with a slag wool or silk waste, or something of that sort, in a tin sheet, when packed to various densities. A material such as slag wool, of course, was a very good conductor of heat.

It could therefore be stated that if there were no slag wool in the steam pipe covering there would be very rapid convection and very high heat loss, whereas if it were filled with solid slag wool there would be fairly rapid conduction, and again very high heat loss. But in between the two conditions there was a "U" shaped curve; the lowest point of that "U" for the particular size he was working with—about 2 in. of pipe lagging—came to a density of packing of about 10 lb. per cu. ft. It was very much the same with silk waste.

### A New South African Canning Industry

THE South-West African Administration has licensed Swerling and Sons, of Cape Town, to undertake trawling from Walvis Bay, where they intend to erect a factory to freeze crayfish tails and carry out certain processes. This plant is estimated to cost about £18,000. A similar licence has also been granted to the Hicksonia Canning Co., which is operated by Irvin and Johnson, Ltd., of Cape Town. Crayfish canning has been carried on at Walvis Bay for some time, but the freezing of the tails is a new industry and as it develops should provide a large amount of employment to European and native workers.

## Industrial Wastes—II.

### Some Modern Methods of Treatment

THE principal paper mill waste is "white water," which is merely a dilute suspension of paper-making fibre in water. The bulk of it is derived from the watery suspension of fibres passed to the wire screen of the paper-making machines, where 90 to 100 lb. of water are present for each lb. of fibre. In some mills the complete loss of this waste would amount to 10 per cent. of fibre, calculated in terms of the total production of paper. Wherever possible it is recirculated and used in the place of fresh water throughout the mill; for instance, as wash water for chemical pumps. When direct re-use is not possible, "savealls" of the settling or filtration type are installed, the recovered fibre being returned to the paper-making process. The effluent from the "savealls" is treated with alum and passed to a continuous settling tank for the removal of the last traces of coagulated fibre, but still further chemical treatment with chlorine, or chlorine and ammonia, may be essential before final disposal as biological growths are stimulated by the dissolved solids and may cause slime troubles. The average amount of fibre carried by "white water" prior to treatment is 12 to 20 lb. per 1,000 gallons. The effluent from "savealls" of the settling type should carry only 0.4 to 1.0 lb. of fibre per 1,000 gallons, giving a recovery of about 95 per cent.

#### Waste Liquors from Sulphite Process

Waste liquors from the sulphite process of paper manufacture carry a high percentage of organic matter and sulphur dioxide. They may contain 50 per cent. of the dry weight of the original wood and amount to 2,000 gallons per ton of finished pulp. Present practice in the utilisation of these liquors involves evaporation as a preliminary process, demanding the use of special materials of construction for the evaporator on account of the corrosive nature of the waste; in some cases neutralisation with milk of lime is effected prior to evaporation, and after settling, the liquors are cascaded in towers to remove sulphur dioxide. The residue may be converted into tanning extract, core binders for use in foundry work, or mixed with coal prior to briquetting. In another process, evaporation under pressure allows the steam to be passed to the sulphite digesters, where the greater part of the sulphur dioxide is again utilised; the residue, after evaporation, may then find limited use as boiler fuel.

In the soda and sulphate processes of pulping wood the residual liquor re-enters the cycle of operations, this being essential to the economic success of the process. The only true waste is that carried away in the final washing of the pulp, roughly 200 to 300 gallons per ton of pulp produced. By utilising the weaker wash water for the first washing of the pulp it is possible to raise the concentration sufficiently for ultimate evaporation. Alternatively, after straining to remove pulp fibre, sedimentation can be effected by the addition of milk of lime. Any colouring matter which is present can be thrown down by the addition of lime and ferric chloride. The lime sludge can be utilised as a fertiliser, or burned and re-causticised for further use in the mill.

In the manufacture of strawboard, the straw is usually softened to a pulp by cooking with lime or soda lye, and the waste liquors contain a high percentage of organic matter. No practical method for the complete utilisation of this waste has yet been developed. In most cases it is treated with lime and passed through continuous settling tanks, followed by filters.

#### Tannery Waste Problems

Liquid tannery waste includes soak water containing soluble mineral salts and suspended dirt; sodium sulphide solutions; dilute ammonium chloride and brine from bathing operations; fat liquor emulsions; spent tan liquors, etc. The components are relatively innocuous, but highly odorous. In some cases, large quantities of sludge are deposited, representing (in the case of tan liquors) a loss of 20 to 25 per cent. of the tan present in the tanning material employed.

There is no economic method available for the recovery of the chebulinic and ellagic acids derived from the spent tan liquors. Screens, settling tanks and filters may be used for removing the suspended solids. Chemical treatment is often of assistance, or a necessity, in the control of pH value. The reagents used are aluminium sulphate or sulphuric acid, but in view of the large quantity of effluent to be treated the cost of flocculation and pH adjustment is almost prohibitive. In some cases the wastes are treated with slaked lime and passed through sand filters; in this way 60 to 70 per cent. of the organic matter is removed and the effluent should be satisfactory for passage to the sewer. The disposal of the sludge may present difficulties as it becomes very objectionable when exposed to the air, but cinder-bed drying is generally considered satisfactory. Spent tan liquors and bleaches are most difficult to treat and the best arrangement is to discharge them at a uniform rate from day to day.

#### The Chrome Process

At tanneries where vegetable tanning processes are employed, the volume of suspended solids in the liquid waste may be high, as a large amount of solid matter is introduced with the tanning medium. With the chrome process there is a less concentrated waste, but treatment may be more difficult; this waste is also more highly coloured. In general practice the alkaline liquor from the de-hairing vats is mixed with the acid liquor from the dye vats in order to effect partial neutralisation. Hair is then removed by fine rotary screens, the screened liquid being treated with alum and additional lime, or merely with lime alone. Coagulated solids and precipitated colouring matter are then removed in continuous settling tanks, and the effluent can be either sterilised by chlorine or rendered innocuous by percolation through cinder-beds. The sludge from the settling tanks, which carries 90 to 94 per cent. of moisture, decomposes very rapidly; it can be dewatered on vacuum filters, and has even been successfully centrifuged and dried prior to burning.

At a tannery where the amount of waste to be dealt with is 400,000 gallons per day, solids removed by the screens average 3,000 lb. per day calculated on a wet basis with a moisture content of 70 to 80 per cent. Prior to treatment the oxygen consuming power varies from 900 to 2,000 parts per million; after treatment it is 250 to 350 parts per million. At tanneries adjacent to metal mills, spent pickle liquor has been successfully used as a coagulant.

#### Tannery Lime Residues

About two tons of slaked lime contaminated with dirt, soluble nitrogen compounds, sulphur compounds, hair and grease are obtained in the de-hairing of 1,000 hides. No cheap method is at present available for the treatment of this waste. Residues are not easily disposed of for agricultural purposes as the price obtained, after drying, is not competitive with that of fresh unslaked lime.

Semi-solid waste includes "fleshings," raw trimmings and limed pieces, together with trimmings and unusable pieces of tanned leather. The untanned material is utilised for the manufacture of glue and gelatine. Most of the fat goes to the glue works with the "fleshings," but in the case of sheep skins it is profitable for the tanner to extract the fat by passing the skins through a hydraulic press, subsequently selling the fat to soap works. Vegetable-tanned scrap can be digested with sulphuric acid for use as fertiliser ingredient, or submitted to dry distillation for recovery of ammonium salts and pyrroles and simultaneous production of charcoal. Chrome-tanned scrap can be stripped of its "chrome" by means of an alkaline solution containing 1 to 2 per cent. of magnesia, the de-tanned collagen being used as glue stock.

A NEW company known as the Coimbatore Cement Co., Ltd., has been started in the Madras Presidency with a capital of Rs.35 lakhs. The factory will be established at Madukarai in the Coimbatore district, and will be capable of producing 60,000 tons of cement a year at the outset.

## The Twentieth Annual British Industries Fair

### Beginnings of a Trade Revival

THE twentieth annual British Industries Fair, the largest and most representative display of the industrial products of the British Commonwealth of Nations ever brought together in a trade show, opened under favourable auspices on Monday at Olympia and the White City, London, and at Castle Bromwich, Birmingham, and will be continued until March 2. In London there was no formal opening, but the Birmingham Section was opened by Alderman H. E. Goodby, Lord Mayor of Birmingham, at a luncheon given by the Birmingham Chamber of Commerce, over which the president of the Chamber, Mr. W. L. Chance, presided. The Duke of York attended the banquet given by the Government at the Mansion House on Monday night on the occasion of the opening of the Fair. Mr. Walter Runciman, President of the Board of Trade, presided, and the 400 guests included members of the Diplomatic Corps, representatives of the Dominions and Overseas Possessions and buyers from many foreign countries.

The floor areas of the buildings occupied in London and Birmingham exceed thirty acres and the frontage of the indoor stands amounts to about 38 miles. There are 2,545 firms exhibiting, with a total stand area of 762,280 sq. ft., in addition to which there is an outdoor section at Castle Bromwich occupying 50,000 sq. ft. The chemical section of the Fair at Olympia, which was reviewed in *THE CHEMICAL AGE* last week, is one of the ten sections which have shown an increase this year.

Born as a war-time experiment in 1915, the first Fair consisted of about five miles of stands at the Royal Agricultural Hall, London; this year the stand frontage is fifteen times the length of Oxford Street.

Since 1920, when the "heavy" industries section of the British Industries Fair was first organised at Castle Bromwich, Birmingham, repeated additions have been made to the exhibition buildings housing the section. In extending the

indoor area, the Birmingham Fair Management Committee has changed and greatly improved the entire layout of the Fair at Castle Bromwich. Instead of the nine main groups, some of which overlapped at the last Fair, there are now six: Hardware, heating, gas, building and decoration, electricity and engineering. Acting on the advice of the Duke of York, who toured the Fair on the opening day last February, the Fair Management Committee arranged for the adoption of "open stands" with names and other details clearly shown at the back in place of the "closed-in," four-poster bed type encumbered with unnecessary superstructures and overhead signs. With superstructures and partitions removed, individual exhibits stand out more clearly, and looking down the gangways, the visitor sees, instead of rows of partly closed booths, clear wide vistas of exhibits with makers' names prominently in sight.

Exhibits in the gas section include plant, appliances and accessories for the manufacture, distribution and use of coal gas for both domestic and industrial purposes. The section has been organised in co-operation with the national organisations, the National Gas Council, Institution of Gas Engineers, Society of British Gas Industries and the British Commercial Gas Association. Many new products have been developed during the past twelve months and several of them are shown for the first time. The engineering section is probably the most varied section in the whole Fair. The list of exhibits is a catalogue of the resources of scores of different industries involving engineering in all its aspects. With such a diversity of products, sub-division has been essential. In addition to the many exhibits classified under the general term of "engineering" are those representing three other comprehensive groups: (a) metals, (b) quarry, roads and mining, and (c) transport. Following are notes on some of the stands at Birmingham of special interest to the chemical industry.

### Some of the Stands at Castle Bromwich

#### Atlas Preservative Co. Ltd. (F.641)

THIS exhibit is of particular interest to those concerned with the economic upkeep of plant, buildings and equipment constructed of iron and steel or timber. The display consists of mechanical models designed to demonstrate the elasticity and durability of "Atlas Ruskilla" iron and steel paint, together with coated specimens, test plates, etc. It is claimed that this material, by reason of the special medium employed in it, will stand up to conditions which would render ordinary paints too short-lived to prove profitable. It grips the metal tenaciously, forming a tough covering which all through its long life stubbornly resists the attacks of acid and alkaline fumes, steam, moisture and exposure to weather.

#### W. and T. Avery, Ltd. (F.533)

IN the field of weighing machines at this stand, notable exhibits include a new counting machine for handling repetition work; and (as a working exhibit) an automatic weigher for continuously weighing any dry free running material flowing by gravity. Among the testing machines there is a new transportable self-indicating universal machine of 5 tons capacity. Two self-indicating counting machines are of particular interest to makers of repetition work, and to those responsible for efficient storekeeping and stocktaking. An unusual type of machine is a butter moisture scale as used in New Zealand dairies for ascertaining the moisture content of butter. Another interesting instrument is that for de-

termining the correct moment of the saturation of barley in the malting process.

#### Bakelite, Ltd. (E.430)

MOULDINGS produced from Bakelite moulding materials, laminated sheets, rods and tubes, varnish, lacquers and soluble resins and varnishes made from these resins are being shown by this firm. Bakelite laminated sheet has been employed in the construction of the stand. In addition there is a display of the various grades of laminated sheet, some of which are particularly resistant to water, acids and weak alkalies and have very high dielectric strength. A range of new resins, varnishes, lacquers and cements is available for inspection.

#### Birmabright, Ltd. (F.454)

THE exhibits of this firm comprise all cast and wrought forms of the Birmabright corrosion-resisting (aluminium) alloy, including rolled sheet and strip, extruded bars, sections and tubing of various shapes, drawn wire, etc. A number of special examples of fabricated work are being shown. Different surface finishes that can be obtained with Birmabright are also demonstrated. The high performance of Birmabright under corrosive conditions is illustrated by specimens that have been exposed to sea water and atmospheric action in comparison with specimens of other materials.

**Birmingham Battery and Metal Co., Ltd. (F.121)**

AT the front of this stand are representative examples of the company's production of large seamless copper and brass tubes from 6 in. to 18 in. inside diameter, such as are supplied for steam pipes and other engineering purposes, as well as for rollers in the paper and textile trades. The pillars supporting the facia consist of B.B. special finish copper housing pipes for water and heating services. The main pillars consist of banks of cupro-nickel condenser tubes in 70/30 and 80/20 alloys, and aluminium-brass condenser tubes (as produced under B.N.F. Pat. No. 308,647). The complete stand represents the actual products that have built up an old-established business which has been in existence for 100 years.

**Fredk. Braby and Co., Ltd. (D.411)**

THE wide range of manufactures at this stand includes plywood panels covered with various metals; electric heating panels; steel barrows and bins; tanks, cylinders and cisterns; a welded copper furnace pan; a display of welded steel drums of various types for packing and storing liquids, powders, etc.; a stainless steel milk tank; perforated metals; normalised and special-finish steel sheets; and a can elevator and cable conveyor (at work).

**Britannia Tube Co., Ltd. (F.240)**

THE varieties of cold drawn steel channels and tubular sections regularly produced by this firm appear to have no limit in number and their exhibit demonstrates their capacity for dealing with all possible requirements. Tubes, as they understand them, are drawn metal of many other shapes than the plain round and it has been indicated that the purposes to which they are or may be put approach the infinite.

**British Oxygen Co., Ltd. (F.521)**

IN addition to equipment and materials for use with the oxy-acetylene and electric arc-welding processes, the exhibits at this stand include dissolved acetylene flarelights. New applications of the oxy-acetylene process include the vacuum type dissolved acetylene economy regulator (for cutting only), a two-jet welding blowpipe, and new types of both hand-driven and portable straight line oxygen cutting machines. The two-jet welding blowpipe represents further development in B.O.C. blowpipe practice. The controls are placed well forward for easy manipulation. Special attention has been devoted to the question of securing trouble-free service under all conditions, and several special features have been incorporated to secure this end. The two jets are at an angle to one another so that when the blowpipe is held in the right position for welding, the first—and smaller—provides the exact amount of preheating which the work requires. Operators will be pleased to know the blowpipe is well-balanced and comfortable to handle. A speed much faster than that of the usual blowpipe is obtained with this two-jet blowpipe; the weld which it makes is sound, strong and ductile. Welding with the two-jet welding blowpipe, therefore, ensures a production cost less than that of the old methods.

**British Road Tar Association (F150/250)**

AT this stand the Association's industrial and general interest talking films entitled "Coal Mine to Road" and "The Highway" are being exhibited. The Association extends an invitation to all interested in the construction and maintenance of roads to visit the stand, where every opportunity is given to discuss questions relating to the use of tar for roads with technical representatives, who are in attendance.

**The Bryan Donkin Co., Ltd. (C.1019)**

THIS company have been makers of rotary gas exhausters for nearly 80 years, the total number supplied being upwards of 7,000. Models are exhibited of the two-blade and three-blade type. They are also showing a specially designed high speed rotary machine of the multi-blade type which can be used as a blower, exhauster, or compressor for air or gas, and for which they claim greater efficiency, longer life and

more silent working than other machines of the multi-blade type. It is being made in various sizes up to 30,000 cu. ft. per hour, and for pressures up to 5 lb. per square inch. Another speciality of the company is gas valves. These they have been making over eighty years, and their yearly sales have now reached a total of over ten thousand valves. A high pressure double-faced valve is shown with part of the body cut away to show the internal working of the valve. These valves are made to withstand pressures up to 100 lb. per sq. in. They are so designed that the bonnet can be removed and a new nut or spindle fitted whilst the valve is under pressure.

**Cassel Cyanide, Ltd. (F.540)**

THE fact that the case-hardening process is actually demonstrated on the stand, and that visitors can have their own metal parts hardened while they wait, is always the attraction at this stand. Another feature of the exhibit is a varied display of parts suitable for case-hardening by the Cassel cyanide process, or already hardened by this method. Since last year, great strides have been made in the development of Cyanide-bath processes specially for the treatment of abnormal steels. Of these, the "Rapideep" process has reached a high stage of development. Notable progress has also been made in the case-hardening of alloy steels.

**Chance Bros. and Co., Ltd. (D.311)**

THIS firm has arranged for two demonstrations of special glasses, one being to show the working of Calorex and the other that of Maximum Daylight glass. Calorex is the glass which they have evolved for the purpose of cutting off heat while at the same time allowing the greatest possible amount of light to pass through it. The demonstration to show the results obtained consists of a sliding frame which holds clear and Calorex glass, and is placed in front of an electric fire, so that by moving the frame the heat from the fire can be felt as very warm on the face when clear glass is in front of it, but can hardly be felt when Calorex is in the same position. Glass Silk, which is a most efficient insulator of both heat and sound, is another exhibit.

**Chaseside Engineering Co. (F.574)**

THE main item of interest at this stand is the Chaseside Hi-Lift (model A). There are two types of this machine, the main difference being the alternatives of solid or pneumatic tyres and the provision of a  $\frac{3}{4}$  cu. yd. or  $\frac{1}{2}$  cu. yd. scoop. The machine will shovel from the ground and load up to 9 ft. high, such materials as coal, stiff tarmacadam, quarried stone, gravel, sand, loose chemicals and metal scrap. It is easily manoeuvrable, and can travel at 10 m.p.h. It will handle economically from 5 to 40 tons of material an hour at a cost which, including depreciation and driver's wage, averages something like 1 $\frac{1}{2}$ d. per ton. It is foolproof and very sturdily built.

**Chesterfield Tube Co., Ltd. (C.921/3)**

THIS exhibit consists of cold drawn weldless steel steam pipes for high pressure steam installations and weldless steel cylinders for the storage of oxygen, acetylene, hydrogen, carbon dioxide, ammonia, etc. Another interesting cylinder exhibit is the new nickel chrome molybdenum steel storage and transport cylinders now being manufactured for gas traction purposes. Weldless steel headers for boilers, and tubes manufactured from the latest corrosion and heat resisting alloy steels, are also being displayed.

**Cochran and Co. (Annan), Ltd. (C.1021)**

THE boiler to be seen at this stand has been on permanent loan to the exhibition authorities for seven years and is one of the firm's No. 19 size 7 ft. dia. by 15 ft. by 600 sq. ft. heating surface, built to withstand 100 lb. per square inch working pressure. It is a working exhibit and serves to supply steam for heating a large portion of the exhibition building. It is fitted with a Meldrum forced draught grate to utilise dually low grade fuel and reduce smoke emission to a negligible degree.

**Foster Instrument Co. (C.1021)**

IN addition to a complete range of electrical temperature measuring instruments, this firm is showing several new pieces of apparatus and is also demonstrating several special applications of its instruments, particularly those applied to steel works practice. The projected scale indicator is primarily designed as a temperature indicator in which a small section of the scale is greatly enlarged and optically projected on to a ground glass screen on the front of the instrument. By this means an extremely long scale is obtained and at the same time the instrument can be conveniently read from a considerable distance, the reading being clearly visible even under bad lighting conditions. Roll temperature thermocouples are being demonstrated in conjunction with an alarm recorder and projected scale indicator. They are specially designed for measuring the temperature of hot rotating rolls such as are used in the steel and paper industries. The thermocouples are mounted on suitable pivots and swivelling arms with counterbalance weight in order to ensure a proper contact and the sensitive portion of the couple can be removed and replaced very quickly. Typical indicating and recording panels which can be used to maintain a constant temperature in electric, gas or oil fired furnaces are also shown.

**General Electric Co., Ltd. (E.343)**

THE 25 h.p. 960 r.p.m. 500 volt, 3 phase motor exhibited at this stand is typical of the range of G.E.C. explosion-proof motors available. The carcase is of a particularly massive construction. No vents or relief valves are fitted, the carcase being sufficiently strong to withstand an internal explosion, while the flanges and bolting arrangements are such that the explosion cannot be communicated to the surrounding atmosphere. The terminal box is also explosion-proof. An important feature of the design is that all the units used to bolt vital parts, such as the terminal box and slipping cover, are shrouded by ribs or cup washers so that they can only be unfastened by a box spanner, thereby minimising the danger of unauthorised interference.

**N. Greening and Sons, Ltd. (F.152)**

A VERY wide range of screening media ranging from very fine wire gauze sieves, as supplied to the Institution of Mining and Metallurgy, up to heavy cylinders of woven wire and perforated steel plates is exhibited at this stand. A novel feature is a working model of a rotary screen built with three sections and a dust jacket. There is also shown a wide range of wedge wire screens, which are a well-known speciality of this firm. Modern methods of production require the extensive use of conveyor belts, and this old-established firm are showing a variety which should offer something suitable for every need from coal picking and conveying to chocolate enrobing.

**G. A. Harvey and Co., Ltd. (B.925)**

THE extensions to their works, which are now completed, afford the industrial plant departments of this firm with increased facilities for manufacturing under modern ideal conditions, and will enable them to meet the increasing demands being made upon them. The extensive range of perforated metals shown on this stand is of particular interest, the innumerable patterns needed for all kinds of sifting, sorting, filtering and grading such diverse materials as coal, stone, cereals, food products, chemicals, etc., are amazing. Woven wire cloths are also produced in all metals and gauges, and the uses vary to a similar extent to those of perforations. This firm also specialises in all kinds of plant needed in food manufacture and produce, vertical processing retorts, vacuum drying, evaporating and distilling plants, sterilisers, jacketed pans, exhausters, cooling tanks, vacuum sealing tanks and can and bottle crates.

**Higgs Motors (E.843)**

THIS firm is exhibiting a comprehensive range of their industrial electric motors from  $\frac{1}{4}$  h.p. to 50 h.p. A special range of fractional horse-power motors with several exclusive

features, and with a high-class external finish for domestic machinery is also being shown. In addition, there is a display of repulsion start single phase motors, and a representative show of component parts used in the manufacture of all sizes.

**High Speed Steel Alloys, Ltd. (F.920)**

THE products on view at this stand consist of pure metals and ferro alloys of tungsten, vanadium, molybdenum, chromium, etc.; also a number of alloys used in the non-ferrous industry. A representative range of fine chemicals of some of the above metals is being shown in grades suitable for commercial and laboratory uses. The application for alloying elements in steels suitable for many engineering purposes is demonstrated by exhibits secured through the co-operation of well-known steel and engineering firms employing the products of High Speed Steel Alloys, Ltd. Finished and semi-finished engineering parts are on view, also tensile, torsional, and impact tests are shown of the various grades of alloy steels in general use.

**Robert Jenkins and Co., Ltd. (F.835)**

THE exhibits on this stand include a patent centrifugal dryer, which consists essentially of a cylindrical mild steel shell containing a central rotating shaft to which a number of metal cones are attached. A corresponding number of metal cones are fitted to the shell, the inner diameter of these being slightly larger than the dishes, so that the unit can easily be erected. The material is fed in at the top by an elevator or other means, and falls upon the topmost dish. It is then flung by centrifugal force against the cone, from which the particles fall by gravity to the next dish, and so on. There are also a series of glass enamelled vessels; petrol storage tanks; ground unbreakable manhole covers made in steel chequer plate in all standard sizes; gilded tubes; and acid evaporating plant. This latter is of semi-commercial size and has an output of thin liquids of up to 15 gallons of water evaporated hourly. This type of evaporator may also be worked for concentrating salting liquors. In one plant recently supplied the crystals were continuously removed from the bottom of the salt box through an elevator; thus working as a continuous crystalliser, the crystals afterwards being passed to a centrifuge and from thence to a Jenkins centrifugal dryer. In connection with glass enamelled vessels it may be added that Robert Jenkins and Co., Ltd., are the only firm in Great Britain who design, make and enamel vessels under one roof.

**Ley's Malleable Castings Co., Ltd. (F.433)**

THE "Black Heart" malleable castings shown on this stand are claimed to be superior to any other malleable iron manufactured in this country, and it is far less sensitive to changes in section than are any other types of malleable, and as there is strictly accurate control of ingredients and manufacture the production of a high tensile casting with a high yield point and excellent ductility is achieved. Further, owing to the presence of the graphitic temper carbon and the absence of hard spots, extremely high machining speeds are obtainable, with reduced wear and tear on tools.

**McKechnie Bros., Ltd. (F.355)**

THIS exhibit includes "Tank" and "MKB" extruded brass, bronze and white metal rods and sections, chill cast phosphor bronze and gunmetal bars for bushes and bearings, phosphor bronze, gunmetal, manganese bronze, naval brass, and nickel silver ingots, manganese copper, granulated nickel and antifriction metals. There is a wide range of samples of extruded sections. They are also showing sulphate of copper and lithopone as manufactured at their Widnes works.

**Mond Nickel Co., Ltd. (F.412)**

THIS is a comprehensive display of exhibits depicting typical uses of nickel and its more important alloys; interesting new developments are being featured and special attention is drawn to the services offered by the Bureau of Information on Nickel. Since the last Fair, the first pieces of equipment made in this country of two new nickel-containing materials have been put into service. One of

these materials is nickel-clad steel, a composite product consisting of nickel rolled on to steel at a high temperature to give a perfect bond, which possesses many of the valuable properties of pure nickel and offers a solution to many problems where thick section, strength and resistance to corrosion are required at moderate initial cost. The other new material is the nickel-chromium alloy called "Inconel," which is characterised by excellent corrosion-resisting and mechanical properties and can be readily welded. Important advances have been made in the development of nickel alloy cast irons and a wide range offering high hardness and strength and enhanced resistance to heat and corrosion are now available. New uses are rapidly being found for these improved cast irons, and a number of typical applications are shown.

#### **Nobel Chemical Finishes, Ltd. (D.511)**

EVIDENCE of a company's belief in its own products is strikingly afforded by the stand jointly occupied by Nobel Chemical Finishes, Ltd., and the Frederick Crane Chemical Co. These two companies, both of which are associated with Imperial Chemical Industries, Ltd., have completely decorated their stand in paints and varnishes of their own manufacture. Heat-resistant chemicals for use on gas fires are shown, together with the "Low Bake" enamels, and "Synobel" electrical varnishes. Special attention is directed to the success of "Dulux" varnishes in finishing commercial vehicles.

#### **Henry Simon, Ltd. (F.255)**

THE "Synchroweigh" blending system shown on this stand demonstrates a recently developed method of blending materials by weight. In a number of industries the problem of mixing different materials in definite weight ratios is difficult of solution. It is generally realised that where materials of different values are blended or mixed it is important both from a technical and economic point of view that they should be proportioned by weight. In a great number of industries the proportioning is carried out either by hand weighing, which is wasteful and unreliable, or through mechanical means of volume measurement, which obviously is incorrect owing to the variable densities of different materials. With the scientific trend towards balanced food values, proportioning of the materials by weight is really essential, and the same can be said particularly in the case of valuable chemicals, powders, etc. Appreciating the importance of this phase in the process of manufacture, Henry Simon, Ltd., have developed a system of automatically proportioning by weight. A typical system comprises a battery of specially designed electrically synchronised automatic weighing machines, which may be either fixed or portable, an electro-magnetic totaliser and, where required, a pre-setting control unit which automatically cuts off the delivery when the quantity as pre-set has been weighed and delivered, and starts or stops any process or conveying units as required. The proportioning is carried out merely by placing weights on the weigh pans (denominated in percentages, the complement being equal to 100 per cent.) corresponding to the required percentage of the respective ingredients. The weighers can be tested for accuracy at any weighing, merely by lifting the compensating weight. Should the supply to any of the weighers run out, all the other weighers in the system are immediately stopped, so that there is no possibility of an incorrect blend.

#### **John G. Stein and Co., Ltd. (F.815)**

THIS firm is exhibiting high grade firebricks, silica bricks and sillimanite bricks for use in the iron and steel works, boiler installations, gasworks, glass works, etc.

#### **Stewarts and Lloyds, Ltd. (F.311)**

THIS firm is showing tubes and joints covering practically every purpose for which mild steel and wrought iron are suitable. Particular mention may be made of the Dawson joint, which is an all-welded joint, with flanges as an additional safeguard, suitable for the highest pressure steam; the Johnson coupling for use on plain ended pipes conveying gas, water, etc., which provides both angular and longitudinal flexibility; and Stewarts' spherical welded joint, which is

particularly valuable for large mains conveying town gas, coke oven gas, air, etc., and which allows deviations up to 5° to be made at each joint during laying, thus permitting all normal curves to be negotiated without springing the pipes or using special bends. A number of coils are exhibited, but these do not pretend to represent the almost infinite varieties and sizes of coils to meet all requirements which can be supplied.

#### **Tube Products, Ltd. (F.440)**

ELECTRICALLY welded steel tubing in sizes from  $\frac{1}{2}$  in. to  $2\frac{1}{2}$  in. is being shown here. A variety of products made with this tubing includes steel ladders, handrailing, furniture, etc. The tube has a remarkable surface which is ideal for plating, enamelling and decorative treatments.

#### **Tungum Sales Co., Ltd. (F.823)**

THIS exhibit demonstrates the many uses to which Tungum alloy can be applied in special relation to the chemical industry. The alloy is seen in its various forms, sheet, rod, tube, wire, castings, and gauze, and it is evident that the latter, as well as the tubing, are of exceptional interest. Tungum has certain anti-corrosive properties in regard to such acids as sulphuric, acetic, hydrochloric acid, and against sea water corrosion, which are proving invaluable in many circumstances.

#### **Turners Asbestos Cement Co. (C.631)**

LITTLE more than twenty-five years ago the virtues of asbestos were almost unknown from the commercial point of view. To-day there is a great industry devoted to the manufacture of asbestos and asbestos-cement goods for a multitude of purposes and trades. This stand provides evidence of the growth of one branch of the industry. "Everite" asbestos-cement pressure pipes for water and gas mains have come to be regarded as eminently suitable for all types of pipe lines. They are light, strong, non-corrosive, free from incrustation and electrolytic action, and are infinitely durable. "Everite" asbestos-cement flue goods, designed to suit the needs of gas engineers and gas salesmen, are supplied in an extremely wide range of shapes and sizes. The nature of the material, its insulating qualities, its freedom from condensation, and its light weight, are all points in favour of its extended use. "Turnall" asbestos reinforced aluminium foil provides an efficient low priced insulating material which is at once light in weight, convenient to handle and apply, and infinitely durable in performance. It is resistant to wind and air infiltration, to water and to dampness. It provides insulation more effective than that given by one inch slab cork and the saving in weight, cost, labour and construction is very appreciable.

#### **Walker, Crosweller and Co. Ltd. (C.112)**

THE well-known sensitive recorders, for recording the "pull" by exhausters on vertical retorts, are shown on this stand, as well as ordinary pressure recorders for use on district pressures and vacuum recorders for chimney draught, etc. A mercury-filled pressure recorder is also shown, and this is typical of a compact and accurate high pressure instrument. Arkon gas and air-flow recorders are now equipped with electrical remote indicator, electrical remote recorders and/or electrical integrators. The standard low pressure flow recorder, with and without mechanical indicator dial, is shown as well as the high pressure recorder for measuring air and gas flows and purifier sections. A complete set of standard water-filled full-scale gauges is another exhibit; these are more handy for taking off quick readings than are the U-tube gauges and they are available if required with a non-freezing oil filling for use out of doors. A further instrument of interest is the Arkon combined blast volume and pressure recorder for use on foundry cupolas, whilst an almost identical instrument serves to record the volume of air, together with depression in inches W.G. in the ventilation shaft of a coal mine. A special sensitive draught recorder for control of brick burning will be seen as well as standard air volume recorders for measuring free air to turbo compressors, etc.

**Henry Wiggin and Co., Ltd.**

THESE specialists in the manufacture of nickel and nickel alloys are showing exhibits illustrating the diversity of application of their products. Pure nickel finds wide employment in the food industries and its use in this direction is illustrated by a steam jacketed tilting pan. Typical applications of Monel metal in this field will also be shown. The application of nickel gears and pinions in water meter mechanisms is typified by a Kent "M" type meter. In industrial filtration woven Monel metal cloth now plays an increasingly important part and a filter, as employed in dry cleaning plants, for handling carbon tetrachloride, trichlorethylene and other solvents, is exhibited. A new development of considerable importance is the introduction to this country of "Inconel." Originally developed for use in the dairy, where it has proved eminently suitable for handling milk, the usefulness of this nickel-chromium alloy in other branches of the food industry is becoming quickly appreciated.

**Zinc Alloy Rust-Proofing Co., Ltd. (F.144)**

THIS display consists of specimens of steel articles selected from various trades. These articles are rust-proofed by the Sherardising process in order to demonstrate the suitability of this method of protection for the trades concerned. The stand serves principally as a technical information bureau to those interested. A considerable number of fellow exhibitors are showing on their own stands samples of their own products rust-proofed by the Sherardising process.

**Other Exhibits**

The following firms are also exhibiting at Birmingham. Features of interest to the chemical industry displayed on their stands will be referred to in subsequent issues of *THE CHEMICAL AGE*: Babcock and Wilcox, Ltd.; Lancashire Dynamo and Crypto, Ltd.; Negretti and Zambra; Pegson, Ltd.; Pneulec, Ltd.; The Rheostatic Co., Ltd.; and The Sigma Instrument Co.

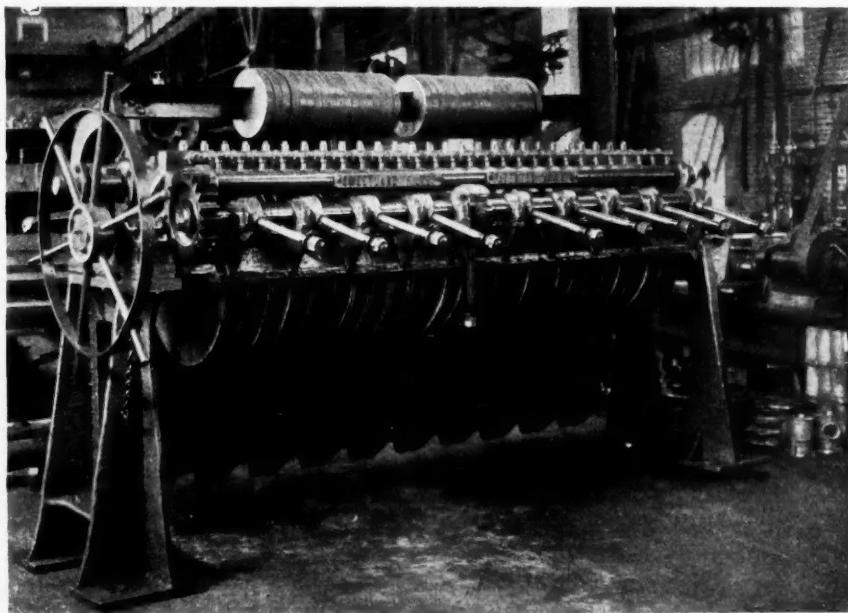
**Monel Metal Wire Cloth in Filtering Service****Application in the Treatment of Slurries**

THE use of Monel metal wire cloth in the separation of solids and liquids from slurries has advantages over other types of filters, principally on account of the alloy's high durability and its property of withstanding the erosive action of fast filtering fluids.

There are many industries in which slurries—suspensions of solids in liquids—occur, and call for filtration, including the manufacture of foodstuffs, beverages, dyestuffs, chemicals, fertilisers, lubricating oils, cement, paper and metal-

as possible before it is in a suitable form for transport to a dump.

The Dorr-Oliver Co., Ltd., the well-known chemical, metallurgical and sanitary engineers, and manufacturers of industrial filtration plant, uses Monel metal wire cloth in its "Oliver" continuous vacuum filters, and "Sweetland" pressure filters. The leaves are covered on both sides with a fine multi-plex weave Monel metal wire cloth, sweated taut to the leaf frame and finally secured by a riveted external

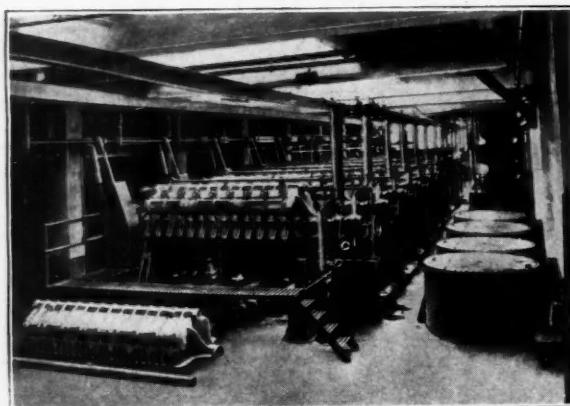


Sweetland Pressure Filter fitted with Monel Metal Wire Covered Leaves.

urgical products as well as in the treatment of sewage. Either the solids or the liquid may be the product to be recovered from the slurry, or, in some cases, both the solids and the liquid have their separate uses. These products may be the finished product of the industry, or a substance derived in an intermediate stage and requiring further treatment. Sometimes it will be a works effluent which must be freed of suspended matter before being sent to river or sewer; again, a residue which must be freed of as much moisture

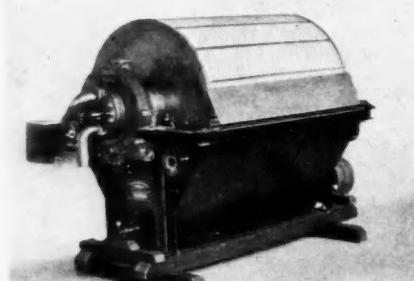
frame. The slurry for filtration is pressure-fed to the filter shell and submerges the leaves, the liquor passing through into the interior of the leaves and the solids being retained on the Monel metal cloth, where they form an even thickness cake. This filter is in extensive use for refining sugar juices, dyestuffs products, fertilisers, dry cleaning solvents, lubricating oils, beverages, varnishes and enamels, works effluents and many chemical applications. The pressure against the cloth is generally a maximum of 50 lb. per sq. in.

An acid-resisting type of "Oliver" continuous rotary vacuum filter is shown in one of the illustrations. This particular machine is constructed almost entirely of Monel metal, and it employs Monel metal wire cloth for the filtering surface.



An Installation of 12 Vallez Filters in an American Sugar Plant.

face of the drum periphery. In filters of this kind, the slurry is continuously fed to the tank, wherein a constant level is maintained, and the solids are picked up by vacuum suction on to the drum surface as an even thickness cake, the liquor



Oliver Continuous Rotary Vacuum Filter of all Monel Metal construction.

being drawn through into the interior of the drum. The doctor blade, seen to the right of the illustration, automatically and continuously removes the cake from the drum surface, and is assisted by a reverse air-blow, which enters each

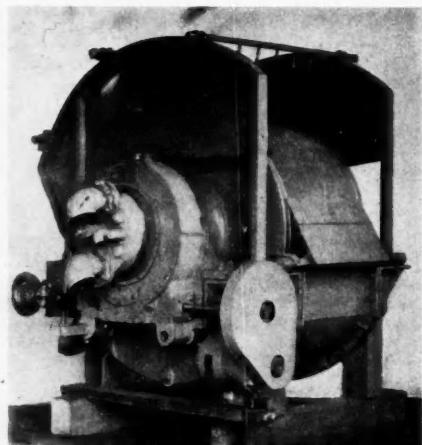


Filter Unit in Monel Metal in a Scottish Corporation Waterworks.

section of the segmental drum interior as it approaches the doctor. The reverse air-blow is also applied under the doctor to clean the Monel metal wire cloth. To retain the cloth in position it is wound round the Monel metal wire at a spacing

of about 2 in., as seen in the illustration. An agitator in the bottom of the tank maintains suspension of the solids in the slurry.

Rotary vacuum filters are best suited to comparatively easy filtering products. The vacuum supplied is rarely in excess of 20 in. mercury and is, therefore, a much lower effective filtration pressure than obtainable in a pressure filter. Metallurgical pulps, as met with in the handling of gold, copper, lead and zinc ores, form a large application for rotary



Oliver Filter fitted with Monel Metal wire cloth and wound with Monel Metal wire.

vacuum filters; household salt, cement, lime muds from causticising plants, paper pulp thickening and washing and paper mills effluent, beet sugar carbonation juices, cane sugar defecation juices and activated sewage sludge are also among the larger uses. The type of wire cloth employed varies according to the product handled. Square mesh weave from 40 to 60 mesh is frequently used, as also are various Hollander weaves, for example 24 by 110 mesh. In many cases, a Monel metal undercover of stouter mesh, such as 8 mesh, is also used to give support to the fine Monel metal filter cloth.

#### National Physical Laboratory

PAPERS published by the staff of the National Physical Laboratory during January, 1934, include:—

"Thermal Insulation." By E. Griffiths. The "Howard Lectures," 1933. "Journal of the Royal Society of Arts," 81, 911, 930, 945.

"Corrosion-Fatigue Characteristics of an Aluminium Specimen consisting of two crystals." By H. J. Gough, and D. G. Sopwith. "Journal of the Institute of Metals," 52, No. 2, 57.

"The Testing of Steam Pipe Heat Insulating Materials." By C. Jakeman. "Engineering," 137, No. 3, 547, 1, and No. 3, 549, 58.

"The Surface Tension of Liquid Metals. Part 5.—The Surface Tension of the Lead-Tin Alloys." By L. L. Bircumshaw. "Philosophical Magazine," 17, 181.

#### Indian Forest Products Research

ACCORDING to the latest report of the Forest Research Institute at Dera Dun the research conducted there is resulting in the increasing use of forest products in and outside India, and the better organisation of forest industries. Considerable success has been attained in the testing of various woods for use as containers and the treatment of bamboo for the production of paper pulp on a commercial scale. In several provinces the making of charcoal as a by-product, the extraction of turpentine and the cultivation and processing of lac are providing subsidiary occupations for cultivators in the neighbourhood of forests. Something has also been done by way of experiment in the extraction of essences from medicinal herbs, and of oils, gums, resins, and dyeing and tanning materials from forest trees and plants.

## British Overseas Chemical Trade in January

### A Slight Decrease in Exports

EXPORTS of chemicals, drugs, dyes and colour during January were valued at £1,426,661, as compared with £1,434,875 for January, 1933, a decrease of £8,214. Imports amounted to £1,009,618, as compared with £734,622; re-exports were £34,278, as compared with £30,935.

	Quantities.		Value.		Quantities.		Value.	
	Month ended	January 31,	Month ended	January 31,	Month ended	January 31,	Month ended	January 31,
	1933.	1934.	1933.	1934.	1933.	1934.	1933.	1934.
<b>Imports</b>								
Acids—								
Acetic .. cwt.	14,711	18,229	26,877	28,007	Bleaching powder (chloride of lime) .. cwt.	32,343	51,288	9,286 13,956
Boric (boracic) ..	2,680	3,010	2,545	3,059	Tar oil, creosote oil, etc. gal.	278,027	2,544,348	6,873 37,791
Citric .. .. "	61	700	206	2,103	Other coal tar products value	—	—	22,165 28,220
Tartaric .. .. "	2,575	5,401	8,771	21,354	Copper sulphate .. tons	2,366	2,946	36,023 42,457
All other sorts .. value	—	—	9,328	12,086	Disinfectants, insecticides, etc. .. cwt.	33,889	29,268	80,295 63,891
Calcium carbide .. cwt.	87,442	108,681	48,835	59,113	Glycerine .. .. "	12,046	16,628	24,433 34,679
Potassium compounds—					Lead compounds .. "	11,150	10,441	13,594 13,206
Caustic and lyes ..	5,619	12,589	6,698	15,068	Magnesium compounds tons	406	305	9,291 8,672
Chloride (muriate) ..	34,388	60,679	19,596	25,252	Potassium compounds cwt.	8,520	6,027	13,583 13,019
Kainite and other mineral potassium fertiliser salts .. cwt.	43,429	102,272	7,324	15,712	Salt (sodium chloride) tons	19,568	21,278	59,148 55,495
Nitrate (saltpetre) ..	2,620	5,605	2,995	5,244	Sodium carbonate, including crystals, ash and bicarbonate .. cwt.	231,389	280,002	61,530 77,960
Sulphate .. .. "	20,905	15,074	11,533	6,997	Caustic soda .. .. "	151,269	171,823	102,693 97,193
All other compounds ..	6,058	8,342	10,435	13,299	Sodium cyanide .. .. "	9,699	8,307	33,780 28,817
Sodium compounds—					Other sodium compounds cwt.	113,887	70,309	53,547 34,795
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	8,376	21,873	2,439	6,620	Zinc oxide .. tons	651	656	12,516 13,850
Chromate and bichromate .. cwt.	3,089	4,683	4,590	6,497	All other descriptions value	—	—	154,491 170,883
Cyanide .. .. "	—	1,000	—	2,370	Quinine and quinine salts ozs.	115,765	99,916	15,920 11,350
Nitrate .. .. "	2,001	1	695	11	Proprietary medicines val.	—	—	104,970 105,649
All other compounds ..	10,854	22,533	8,845	18,127	All other drugs and medicinal preparations ..	—	—	134,847 134,740
Other chemical manufacturers .. value	—	—	184,270	275,571	Alizarine and indigo (synthetic) .. cwt.	863	591	7,146 4,850
Drugs and medicinal preparations—					Other finished dyestuffs cwt.	5,082	4,547	59,910 69,749
Quinine and quinine salts ozs.	98,050	69,092	10,467	4,963	Other dyes and dyestuffs cwt.	16,990	16,239	17,573 24,590
Medicinal oils .. cwt.	3,876	1,723	9,989	3,953	Ochres and earth colours cwt.	11,515	11,333	13,703 12,895
Ointments and liniments cwt.	—	2	61	179	Other pigments and extenders .. cwt.	7,683	12,517	11,484 17,058
Proprietary medicines value	—	—	27,171	44,603	White lead .. .. "	0,845	6,479	12,652 12,012
Other manufactured sorts .. cwt.	—	—	40,624	39,623	Paints and enamels, prepared or ready-mixed cwt.	23,379	29,137	66,232 78,072
Raw or simply prepared cwt.	—	—	53,236	38,655	Other painters' colours and materials .. cwt.	38,571	32,401	75,227 65,502
Finished dyestuffs (coal tar) .. cwt.	3,906	4,508	86,981	122,621	Varnish and lacquer gal.	58,791	77,181	23,973 30,103
Extracts for tanning—					Total .. value	—	—	1,434,875 1,426,661
Chestnut .. cwt.	27,899	36,223	18,605	25,840	<b>Re-Exports</b>			
Quebracho .. .. "	15,344	55,887	8,455	35,206	Chemical products value	—	—	10,144 13,786
All other sorts ..	22,183	38,577	20,258	29,402	Drugs and medicinal preparations (manufactured or prepared) .. value	—	—	10,630 6,900
Other dyes, dyestuffs, etc. .. cwt.	3,185	5,259	8,622	15,900	Dyes and dyestuffs and extracts for dyeing and tanning .. .. cwt.	—	—	7,445 8,946
Painters' colours and materials—					Painters' colours and materials .. cwt.	524	328	1,853 3,598
White lead, basic carbonate .. cwt.	5,170	7,210	6,378	8,489	Total .. value	461	545	857 1,048
Lithopone .. .. "	13,824	21,691	10,789	15,178		—	—	30,935 34,278
Ochres and earth colours cwt.	16,075	28,117	7,054	11,814				
Bronze powders .. .. "	2,067	1,519	11,675	10,740				
Carbon blacks .. .. "	29,511	53,227	41,424	55,199				
Other dry pigments and extenders .. cwt.	20,810	27,423	5,556	8,117				
All other descriptions ..	5,541	10,284	11,295	22,646				
Total .. value	—	—	734,622	1,009,618				
<b>Exports</b>								
Acid, citric .. cwt.	3,005	1,395	10,830	4,797				
Other acids .. value	—	—	16,801	21,909				
Aluminium compounds tons	1,662	1,397	14,305	8,070				
Ammonium sulphates ..	26,941	12,508	144,599	80,046				
Other ammonium compounds .. tons	610	538	11,455	9,779				

THE Japan Soda Co., Ltd., which is planning to put out stearine, will also produce glycerine. It is understood that the company is to follow the process of electro-osmosis, patented by Siemens, which will give it an ability to make very pure glycerine. It is not yet decided as to the amount of production.

## Notes and Reports from the Societies

### Institute of the Plastics Industry

#### Midland Section : Art in the Plastics Industry

THE art side of the plastics industry was dealt with by Mr. John de la Valette in an address delivered to the Midland Section of the Institute of the Plastics Industry, at Birmingham, on January 26. He pointed out that in order that the endeavours to establish the industry on its own footing should be successful, due regard should be paid to the value of design and colour. For this purpose there should be incorporated amongst the personnel of the industry men and women possessing the right kind of artistic capacity. Great importance attached to the type of artists selected, and to the use that was made of them. In the plastics industry, both the shape and colour decoration of the objects were inherent to the materials used and the process of manufacture. Continuing, the speaker asked why manufacturers in this country did not follow, in regard to artists, the same methods which they adopted in engaging engineers, chemists or accountants. He thought that this was probably partly due to a certain suspicion in commercial circles that men who knew anything about art must needs be impractical and commercially useless. He did not believe there was any justification for such a view. It certainly was not the experience on the Continent, where they employed an art director, not merely to design objects in theory, but also to try out their manufacture, and with the technical staff to produce new designs accompanied by estimates of the cost of production.

The speaker considered it would be a great advantage to British industry if similar art directors were more widely appointed in British industry. In his opinion there were sufficient creative artists, both men and women, in this country with a keen sense of commercial possibilities to fill the needs in question.

In conclusion the speaker drew attention to the splendid opportunity which was offered to the industry by the Royal Academy Exhibition of British Art in Industry which is to be held at Burlington House, January—March, 1935. He hoped at that exhibition to see a section devoted to the plastics industry of such a nature that not only would it disprove once for all the allegations that mass-produced goods must needs be ugly, thereby rendering a service of national value, but which would also be a wide advertisement for this new and specifically British industry for which a glorious future appeared to lie ahead.

### Society of Dyers and Colourists

#### Manchester Section : The Naphthol Colours

AT a meeting of the Manchester Section of the Society of Dyers and Colourists on February 16, Mr. A. F. Williams read a paper on "Recent Developments in Naphthol AS Dyeing."

The rapid development in the Naphthol AS group of dyes, said Mr. Williams, was not entirely due to bringing out new naphthols, fast colour salts and bases, but more likely to careful observation and the fact of not being afraid to admit errors in original recipes and consequent modification of the dyeing processes. That the dyestuff was formed on the fibre from its components, and that these components often were vastly different in chemical constitution, caused new points to be discovered relating to the production of the dyeing in bulk. Consequently, there was a rich and promising field of investigation for the Naphthol AS dyer, both in the laboratory and in practical production.

The diazo compounds of Variamine Blue B., RT., and FG., differed fundamentally from the rest of the diazo compounds by their distinctly low coupling energy when given the opportunity of coupling with a naphthol of the AS group. In the case of most red bases the coupling process was completed in a few seconds, whilst with the Variamine Blue salts it only took place very slowly. The Variamine Blues were, therefore, almost altogether unsuitable for yarn, machine, or the dyeing of piece goods on a jig; such a slowly coupling

diaz body jeopardising in bulk working the levelness of the dyeing very considerably and also the fastness to rubbing. In piece goods dyeing, using the padding mangle, it was only possible to obtain a satisfactory formation of the dye-stuff after airing for a considerable time, and in the presence of the weakly litmus acid, magnesium sulphate, as alkali binding agents.

The low coupling energy, and the consequent low production, was the cause of the working out of special developing methods to give satisfactory and quicker production of these important blue dyes. The "soda developing" process was worked in such a way that the naphthol impregnated material was passed through a mangle containing an acetic acid Variamine Blue diazo solution and subsequently coupled in a soda ash bath. This method was still sometimes used for producing plain dyed grounds for discharge work.

The important factors which influence the fastness to rubbing were (1) the use of wetting-out agents fast to lime and metallic salts in solution and the acids of the developing baths; (2) thorough hydro-extraction of the impregnated material, in the case of piece goods intermediate drying, (3) the use of Diazopon A in the developing bath; and (4) after-treatment in a concentrated soap bath.

### Society of Chemical Industry

#### Bristol Section : Annual General Meeting

THE annual general meeting of the Bristol Section of the Society of Chemical Industry will be held in the Chemical Department, Bristol University, on Thursday, March 1, at 7.30 p.m.

After the business meeting a paper on "The X-Ray Interpretation of the Molecular Structure of Fibres" will be read by Mr. W. T. Astbury. He will deal with the general principles of fibre structure, and in particular the structure of cellulose fibres, natural silk, and animal hairs. The reversible intra-molecular transformation from alpha-keratin to beta-keratin when animal hairs are stretched will also be discussed.

#### Manchester Section : Rubber Solvents

A JOINT meeting of the Manchester Sections of the Society of Chemical Industry and the Institution of the Rubber Industry was held at the Victoria Hotel, Manchester, on February 16, under the chairmanship of Dr. A. Schedler, when Dr. H. G. Shatwell gave an address on "Rubber Solvents Derived from Coal Tar."

The rapid developments which have taken place in recent years in the rubber, synthetic resin, paint, varnish, lacquer, and other industries, said Dr. Shatwell, have necessitated a corresponding growth in the production of solvents. These requirements are being supplied by the development and extension of well-known reactions like chlorination and esterification, by old and new processes such as fermentation, hydrogenation, oxidation, and petroleum cracking, and by the more skilful treatment of established raw materials such as petroleum and crude tar. In fact, the production of solvents has become an industry of great importance; and the technologist has now at his disposal a wider range of solvents more suitable for general and special purposes than was the case only a few years ago.

Amongst the raw materials from which solvents are made, coal tar holds a unique position. Unlike petroleum, its constituents are essentially aromatic in type; and though the greater proportion of its components are hydrocarbons, substances of acidic and basic characters are also present. Again, unlike petroleum, the composition of coal tar is such that the isolation of individual chemical compounds such as benzene, naphthalene, pyridine, and phenol is readily accomplished. Consequently, in addition to solvents which occur naturally in tar, it is possible by suitable chemical treatment of the pure components, or groups of pure components, to manufacture a range of solvents which are fundamentally dissimilar in properties and which therefore find application in a variety of ways. Some of these products have only been prepared on a commercial scale within the last ten years,

but they have already created a demand which shows every sign of expansion. The distillation of crude tar, followed by extraction of the distillates with caustic soda and dilute sulphuric acid, results in the separation of the tar into acidic, basic, and neutral compounds; these are then separately distilled to produce a variety of products of commercial value. The chief rubber solvents naturally present in the tar and recovered by this scheme are benzol, toluol, xylols, and solvent naphtha. Benzol is chiefly used in the manufacture of quick-drying solutions; solvent naphtha is used in recovery processes.

Many rubber solvents are derived from coal-tar constituents by catalytic hydrogenation. In these processes metallic nickel is almost invariably employed, and it is essential to purify the raw materials and especially to eliminate from them sulphur or other substances which tend to poison the catalyst. The hydrogenations are usually effected under pressures of the order of one to twenty atmospheres and temperatures between  $150^{\circ}$  and  $190^{\circ}\text{C}$ . If naphthalene is hydrogenated in the vapour phase, one of the rings is completely reduced and tetrahydronaphthalene is produced. If, however, the transformation is effected in the liquid phase, that is, under higher pressures, the naphthalene becomes completely reduced and decahydronaphthalene results. It is essential to remove all traces of sulphur compounds from the raw material, refluxing with metallic sodium being the method usually employed. Both tetra- and deca-hydronaphthalene are excellent solvents for rubber, resins, oils, fats, and waxes.

Phenol, hydrogenated in the vapour phase in presence of reduced nickel, gives cyclohexanol; creosols lead to the formation of methyl-cyclohexanols. The cyclohexanols are extremely valuable solvents, and their application in a number of directions is growing rapidly. They are stable to light and air, and can be distilled repeatedly without decomposition. They possess a high solvent power for fats and waxes, liquid and solid hydrocarbons, and certain resins, as well as for both crude and vulcanised rubber. These properties are enhanced when certain other solvents are present. Thus, if decahydronaphthalene be added to cyclo- or methyl-cyclohexanol, the mixture is capable of dissolving a considerable range of the condensation products of phenol and formaldehyde. The hexanols are also used extensively in the varnish and lacquer industries and for the preparation of linoxyn solutions in the manufacture of linoleum and artificial leather. Applied to rubber, a comparatively small quantity gives a perfect solution at lower temperatures than is customary with most other rubber solvents, whilst their solvent action on celluloid enables mixtures of this substance with rubber to be used to prepare composite films.

The oxidation of cyclohexanol leads to the formation of cyclohexanone, whilst esterification in the normal way gives esters, the acetate especially being used extensively as a solvent. In the presence of molybdenum catalysts, phenol and cresols can be converted to benzene and toluene respectively by hydrogenation at  $400^{\circ}$  to  $450^{\circ}\text{C}$ , thus providing an additional method for preparing useful rubber solvents.

## Institute of Chemistry

### Leeds Section : Edward Frankland Medal

A MEETING of the Leeds Section of the Institute of Chemistry was held at the University on February 19, when the Sir Edward Frankland medal and prize were presented to Mr. Walter Lee, a Leeds student, for his paper on "The chemical education of part-time students: Its relation to professional proficiency." This award is given for the best essay on any subject bearing on chemistry or chemical work, written by a registered student of the Institute of Chemistry under 22 years of age, and is open to all members of local sections of the Institute. The object of the award is to induce students to develop a sense of professional public spirit and interest in the position of chemists in the life of the community.

Mr. Walter Lee has been working with Mr. C. H. Manley, the Leeds City Analyst, for the last five and a half years. He was educated at Leeds Grammar School. He has been studying at Leeds College of Technology and lately at Bradford Technical College.

Professor F. Challenger, who presided in the absence of Mr. G. T. Denbigh, made the presentation. Mr. Denbigh was elected chairman of the section. Professor F. J. Channon, of Liverpool, and formerly of Leeds, lectured on "Some Chemical Aspects of Nutrition."

## Chemical Matters in Parliament

### Coal Industry (Hydrogenation)

IN the House of Commons on February 13, Mr. Hall-Caine (Dorset, Eastern) asked the Secretary for Mines what sum would be payable in patent royalties in connection with the hydrogenation of coal under the Government scheme, on the basis of hydrogenating 350,000 tons of coal per annum; and whether these royalties would be payable to interests in this country or abroad.

In reply, Mr. E. Brown said the question of payment of royalties or fees was a commercial matter between Imperial Chemical Industries, Ltd., and their partners in International Hydrogenation Patents, Ltd. He did not consider that he would be justified in asking Imperial Chemical Industries to disclose information of this character.

### Progress of Dyestuffs Bill

WHEN the Standing Committee, which has been considering the Dyestuffs (Import Regulations) Bill, met on February 15, Mr. Holdsworth (Bradford, South) asked Dr. Burgin to give an assurance that the users would be adequately represented on the committee. Dr. Burgin replied that the Board of Trade was fully alive to the matter. They intended to exercise the powers given them under the 1920 Act fairly and properly, so that all interests were adequately represented. On the question of price fixing, Dr. Burgin contended that it was far better to leave the Board of Trade as the executive instrument of the Government to say what was the appropriate remedy to adopt to deal with any specific grievance that might arise.

The Bill was eventually ordered to be reported to the House.

### The Hydrocarbon Oils Bill

THE British Hydrocarbon Oils Production Bill, which provides for a preference in respect of light hydrocarbon oils manufactured in the United Kingdom from Indigenous products, was considered by a Standing Committee on February 20.

One amendment moved by Mr. Grenfell (Gower) provided that the preference should be given in respect of light hydrocarbon oils manufactured "under State ownership and control." This was defeated.

Sir Arnold Wilson (Hitchin) suggested that if the first clause of the Bill were extended so as to cover other hydrocarbons than coal and shale, it would be an encouragement to private enterprise in this country to search for oil where there was good reason to believe it would be found.

The clause was ultimately adopted as originally drafted.

### Dye Research at Bombay University

THE new college of Chemical Technology which has been founded by the University of Bombay and is now under the direction of Dr. R. B. Forster, is installing laboratories for studying the chemistry of dyes and their optical and physical properties, the work being undertaken with special reference to the problems of the Bombay textile industry. In an experimental dyeing laboratory students will have the opportunity of carrying out dye trials on all kinds of fibres and will thus become acquainted with the various types of dyes and their uses. They will there learn to identify the particular class of dye that has been used on dyeing a particular fibre, and be able to reproduce the dyed sample. There will also be semi-works scale bleaching, a dyehouse and a calico printing room, where the students will have opportunities of applying their knowledge and producing the goods. On the chemical engineering side, it is proposed to install small scale chemical manufacturing plant of various types.

## Letters to the Editor

The Editor welcomes expressions of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in *THE CHEMICAL AGE* unless its authorship is revealed to the Editor.

### Mustard Gas

SIR.—Your correspondent "Disarmament" (*THE CHEMICAL AGE*, February 3, page 104) is hardly likely to advance the cause of disarmament by such muddled reasoning and inaccuracy. He quotes Major Freeth that a man would be practically safe in a hot bath, "except from a direct hit." Then to prove him wrong quotes an opinion regarding the effect of mustard gas on a wet skin! This is excellent. But how the liquid gets on to the wet skin of the person seated in the bath except from what must be virtually a direct hit, your correspondent does not stop to consider. The whole effect of his argument is to emphasise Freeth's point that a mustard gas bomb must actually splash the target, human or material.

As to inaccuracy, Major Lefabure was never director of gas warfare on the Western Front; nor did Freeth ever assert that defensive measures had put an end to the value of mustard gas.—Yours faithfully,

"ONLOOKER."

SIR.—"Disarmament," in his recent letter, surely forgets that the infiltration of poison gas into a sealed house is very slight, and that whether in a bath or not, seems of small moment. The idea is, I imagine, to surround oneself with steam and tobacco smoke, as an additional precaution. It would be interesting to have some actual figures for the relative toxicity of phosgene and mustard gas with other poisonous gases and with which we are more familiar in the laboratory, such as hydrogen sulphide, hydrogen cyanide, and chlorine. It will be agreed that elimination of gas from warfare is desirable, but until this is agreed by all nations, and effective means taken to ensure it, it behoves us to be prepared, and in this connection I would suggest that suitable gas respirators should be readily obtainable by such of the civilian population, as wish to have them handy. Germany is under no disillusionment as to the probable use of gas in another war, and the civil population, including children, frequently have anti-gas parades and practice.

Whilst nearly all in our own country earnestly desire general disarmament and peace, in the present temper of Europe another large scale outbreak seems only a question of time, unless a miraculous change of heart and outlook occurs in the more warlike and truculent countries, and until this occurs, it seems folly to neglect our defences. Advocating disarmament in this country is like preaching to the converted, it is in certain other countries that peace propaganda is so necessary and where the atmosphere is more like it was in this country in 1910, where peace meetings were generally broken up with violence. I was recently asked, as a chemical practitioner, where suitable and up-to-date poison gas respirators could be purchased, and frankly I did not know!

Perhaps some of your readers can enlighten us, and also supply hints as to keeping the latest types in a state of efficiency?—Yours faithfully,

ANOTHER PEACELOVER.

### Gas Cylinder Explosions

SIR.—Gas cylinder explosions occur from time to time, some with fatal results. My own experience with gas cylinders has led me to the conclusion that the trouble lies, not with the cylinders, but with carelessness in handling and storing. I have seen oxygen cylinders stored in a shed along with barrels and drums of oil, and it only requires a faulty valve to cause an escape of the compressed gas coming into contact with the oil to cause a fire and a violent explosion, and oily and greasy fittings will cause fire and explosions. Cylinders are often stored in cellars where there is a fire, and the heat may cause an increase in pressure. Manufac-

turers of gases under compression, and gases in solution such as acetylene or acetone, should issue precise instructions with each cylinder, the handling, storing, and the danger of the particular gas in contact with substances of which it is incompatible. The storage of fuel gas which will come into use shortly for use in motor cars should be wound with fine gun wire as an extra precaution against jolts and jars.—Yours faithfully,

HUGH C. CORR.

79 Wanlip Road, E.13.

### Imported Maize Starch

#### Merchandise Marks Committee's Report

THE standing committee appointed by the Board of Trade under the Merchandise Marks Act, 1926, which heard an application on November 20 for a Marking Order in respect of imported maize starch, including maize starch cornflour, has issued its report and recommendations. The application was made by the Maize Starch Manufacturers' Association, and was opposed by the Federation of Grocers' Associations of the United Kingdom, Sir John Francis, Ltd., Chas. Godchaux and Sons, and Boots Pure Drug Co., Ltd. Before the inquiry, which was reported in *THE CHEMICAL AGE* of December 2 (page 508), all the parties except Boots Pure Drug Co., Ltd., came to an agreement.

The committee recommends that an Order in Council be made. Its members are satisfied that in the absence of an indication of origin purchasers cannot distinguish home-produced from imported maize starch or maize starch cornflour. They consider that in this case an Importation Order ought to be made as well as a Sale Order, since, owing to the extreme difficulty of distinguishing between the home-made and imported goods, an Importation Order is necessary for the effective enforcement of a marking requirement. They are also impressed by the fact that the retailers represented at the inquiry attached great importance to the making of an Importation Order to minimise the inconvenience to them of the marking obligation.

It is recommended that the proposed Order should require any bag, sack, box, barrel, keg, bottle, carton or other container in which imported maize starch (including maize starch cornflour) is imported or sold or exposed for sale to bear a conspicuous indication of origin stamped, printed, stencilled or branded thereon, or on a label securely affixed thereto.

No serious difficulty is involved in the proposal to exempt samples from the marking requirement on import, but the object could be better attained by providing a simple exclusion for samples imported by parcel post. The committee considered whether it should not recommend that in the case of maize starch exposed for sale loose there should be a requirement that the goods should be marked by means of a ticket "clearly visible to intending purchasers," as is provided in certain other Orders in force (e.g., with regard to currants and raisins and oats). In view, however, of the fact that such a provision was not pressed for by the applicants, and was strongly objected to by the opponents, and that, in the main, the recommendations are based on an agreement between the parties, it was not thought well to insert such a provision.

There appeared to be legal difficulties in making a distinction between wholesale and retail sale, and to overcome this difficulty the parties suggested that the exclusion should extend to any sale not exceeding a limit of 14 lb. The committee concluded that no special provision for exclusion is necessary under this head.

The proposed Order should come into force three months after it is made, but for a period of nine months after the making of the Order any goods proved to have been imported before that date should be allowed to be sold unmarked.

## News from the Allied Industries

### Artificial Silk

THE CONVERSION RIGHTS in connection with the British Celanese pending issue of 5½ per cent. mortgage debenture stock at par, is on the basis of £110 new stock for each £100 of bonds, plus 10 per cent. premium, or, alternatively, £100 of new stock for each £100 of maturing bonds, plus a cash payment of £10 in respect of 10 per cent. premium.

### Non-Ferrous Metals

THE ZINC CORPORATION states that it is interested to the extent of 50 per cent. in the option held by the Tanami Gold Mining Syndicate, Ltd., on the Rosterman Property, Kakamega, Kenya, concerning which development reports have recently appeared in the Press. Further investigation work is necessary and is proceeding to determine whether the option should be exercised and the commercial development of the property undertaken. Shareholders will be advised when any definite decision is made.

### China Clay

ALTHOUGH JANUARY PROVED RATHER UNFAVOURABLE FOR SHIPPING through the adverse winds, the china clay shipments for 1934 have started the year well with 57,106 tons of china clay. China stone trade, however, has shown a slump notwithstanding the fact that there is no home or foreign competitor for this commodity, which is most essential in the very best pottery ware. January shipments were as follows:—Fowey, 37,402 tons china clay, 1,971 tons china stone, 1,190 tons ball clay; Par, 6,933 tons china clay, 198 tons china stone; Charlestown, 5,258 tons china clay; Penzance, 861 tons china clay; Padstow, 784 tons china clay; Newham, 54 tons china clay; Plymouth, 155 tons china clay; despatched by rail, 5,659 tons china clay. Total tonnage for the month of 60,465 tons.

### Iron and Steel

AFTER PROLONGED NEGOTIATIONS the Japanese Government has sanctioned a huge merger of the Government and private iron and steel works. The new combine, which will be known as the Nippon Iron Manufacturing Co., will have a capital of 345,940,000 yen (approximately £21,021,250 at current rates). The Government will receive 5,683,000 shares valued at 50 yen each as compensation for turning over the assets of the Yawata iron works and its subsidiary companies. These assets are valued at 384,195,000 yen (£17,762,000). The production capacity of the combine is now estimated at 2,890,000 tons of pig-iron and 1,500,000 tons of steel annually. The merger has been arranged in order to rationalise the steel industry on the lines already successfully pursued in other Japanese industries.

### Tanning

OWING TO FEARS OF POSSIBLE PRICE-HARDENING, many sections of the tanning industry are busy. Sole leather tanners, however, are operating with caution because there is not the demand for their best grades. The best class fancy and gloving leather manufacturers are extremely busy and are well booked forward. The fashion has swung back to suede leathers once more and there is a large demand for nigger browns and blacks, both of which are causing leather dyers much trouble. The cheaper end of the fancy leather and shoe lining trades is quiet owing to the demand for cut lines. Increasing quantities of white and fancy coloured cellulose finished sandal leathers are being produced and several large firms are working overtime on their production. Glazed kid exports for 1933 are now to hand and show the remarkable total of 9,500,000 sq. ft. compared with 5,663,000 sq. ft. in 1932, and 4,771,000 sq. ft. in 1931. Imports of glazed kid have declined from over 22,000,000 sq. ft. in 1931, to 7,783,000 sq. ft. in last year.

## Continental Chemical Notes

BUTYL ALCOHOL MANUFACTURE is now being undertaken by a new Czechoslovakian factory near Olmütz.

BARYTES CONCENTRATE with the unusually high average purity of 94 per cent. is now being produced in the flotation plant at Saiair, U.S.S.R.

LITHIUM CHLORIDE AND LITHIUM ALLOYS are again being manufactured at the Hans-Heinrich Hütte, Langelsheim, which closed down last year owing to accumulation of stocks.

THE NEW HYDROGENATION PLANS of the Ruhr coal industry, reported in "Chemische Industrie," include a plant with an annual production of 100,000 tons benzine from 150,000 tons anthracite. This is equivalent to 5.5 per cent. of the estimated German consumption of motor fuel in 1934. Hydrogenation will be based upon the process of Pott and Broche which is capable of effecting preliminary solubilisation of the coal to the extent of 80 per cent.

THE NEW HYDROGEN PEROXIDE PLANT in Czechoslovakia is expected to be in production at the beginning of March, reports "Chemische Industrie." It is sponsored by the Slovakian Aktien-Ziegeleien, who are favourably placed in respect of hydroelectric power supplies. It will be recalled that an earlier project, located at Mährisch-Ostrau, for electrolytic production of hydrogen peroxide ("Chemische Industrie," July 22, 1933), was expected to commence working last autumn.

EXTENSIVE ROCK SALT DEPOSITS are reported to have been discovered in Denmark, near the town of Kolding.

AROMATIC CHLORINATED HYDROCARBONS are proposed as the starting point for phenol manufacture (German Patent 580,646) by reaction with alkali under pressure in contact with potassium or sodium chloride.

AMONG THE NEW PRODUCTS introduced to the market by the Polish chemical industry during 1933 were cocaine and other alkaloids, zinc oxide (pharmaceutical quality), pure sulphuric acid, chromic acid, glauber salt and carbon black.

HYDROGEN CAN BE MANUFACTURED in good yield from water by a purely chemical process outlined in the recently published German Patent 591,753. Advantage is taken of the discovery that hydrogen is evolved with comparative rapidity when a metal of the alkali earth series is brought into contact with an aqueous solution of an alkali earth halogenide. Although immersion of calcium in aqueous sugar solution has been known to generate hydrogen, the velocity of this reaction was impractically low. By the present process, however, it is claimed that immersion of calcium in a molar solution of calcium chloride leads in as short a time as one minute to almost complete reaction with evolution of the equivalent amount of hydrogen. The velocity of the reaction can be modified very conveniently by altering the concentration of the earth alkali salt solution.

## Inventions in the Chemical Industry

### Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

#### Specifications Accepted with Dates of Application

PRECIPITATED TITANIC OXIDE production.—B. Laporte, Ltd., I. E. Weber and A. N. C. Bennett. May 12, 1932. 405,669.

METALLIC ALLOYS.—Kinzoku Zairyo Kenkyusho. July 28, 1931. 405,607.

ORGANIC ARSONIC ACIDS, manufacture of salts.—I. G. Farbenindustrie. July 4, 1931. 405,629.

PHOTOGRAPHIC EMULSIONS, manufacture.—I. G. Farbenindustrie. July 7, 1931. 405,642.

1,4-DIAMINO-2-ARYLOXY-ANTHRAQUINONE-3-SULPHONIC ACIDS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 28, 1932. 405,632.

DÉPHOSPHORISING of steel.—Soc. D'Electro-Chimie, D'Electro-Métallurgie, et des Acieries Électriques D'Ugine. Aug. 31, 1931. 405,633.

FUEL OIL.—D. A. Howes and Imperial Chemical Industries, Ltd. Aug. 5, 1932. 405,658.

SEED DISINFECTANTS and their application, manufacture.—Imperial Chemical Industries, Ltd., and F. L. Sharp. Aug. 5, 1932. 405,675.

SOLUBLE ARSENIC-BISMUTH COMPOUNDS, process for the manufacture.—I. G. Farbenindustrie. Aug. 6, 1931. 405,618.

DECORATION OF SURFACES by means of decalcomania.—E. I. du Pont de Nemours and Co. Aug. 12, 1931. 405,695.

CELLULOSE NITRATE containing camphor, treatment.—E. I. du Pont de Nemours and Co. Aug. 12, 1931. 405,696.

ESTERS OF METHACRYLIC ACID, production.—J. W. C. Crawford and Imperial Chemical Industries, Ltd. Aug. 12, 1932. 405,699.

WATER-FREE ALCOHOLIC LIQUID MIXTURES, production.—Duetsche Gold- und Silber-Scheideanstalt vorm. Roessler. Aug. 17, 1931. 405,705.

DIBENZANTHRONE DERIVATIVES, manufacture.—Imperial Chemical Industries, Ltd. Aug. 15, 1931. 405,706.

ACETIC ACID, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Aug. 22, 1932. 405,719.

HYDROCARBON OILS, conversion.—A. L. Mond (Universal Oil Products Co.). Aug. 25, 1932. 405,721.

OXIDISABLE ORGANIC MATERIAL such as rubber, preservation.—B. F. Goodrich Co. June 16, 1932. 405,797.

CONDENSATION PRODUCTS of castor oil and maleic acid esters, manufacture.—Resinous Products and Chemical Co. May 10, 1932. 405,805.

ALKALI METAL CARBAMATES, production.—Mathieson Alkali Works. March 2, 1932. 405,809.

CELLULOSE ACETATE, production.—A. H. Stevens (E. Berl). April 5, 1932. 405,825.

PAINTS, ENAMELS AND LACQUERS, manufacture.—E. I. du Pont de Nemours and Co. April 8, 1932. 405,826.

#### Complete Specifications Open to Public Inspection

ARSENIC COMPOUNDS, manufacture.—I. G. Farbenindustrie. Aug. 6, 1932. 20832/33.

FLUORINE DERIVATIVES of hydrocarbons, methods of preparing.—Kinetic Chemicals, Inc. Aug. 10, 1932. 22089/33.

INTERMEDIATES for thioindigo dyestuffs, manufacture.—E. I. du Pont de Nemours and Co. Aug. 10, 1932. 22371/33.

LIGHT-SENSITIVE PHOTOGRAPHIC MATERIAL.—I. G. Farbenindustrie. Aug. 10, 1932. 22376/33.

DYEING LEATHER, process.—Dr. R. Schulhoff. Aug. 10, 1932. 22388/33.

EVAPORATING, concentrating and distilling, process.—Soc. of Chemical Industry in Basle. Aug. 12, 1932. 22461/33.

COMPOSITIONS OF FUEL OIL and powdered coal, process of producing.—Radiochemisches Forschungs-Institut Ges. Aug. 12, 1932. 22580/33.

ASPHALTIC PRODUCT, manufacture.—M. Ernotte. Aug. 12, 1932. 22723/33.

#### Applications for Patents

ALUMINIUM ALLOYS.—A. Luschenowsky. Feb. 2. (Germany, May 6, '33.) 3541.

ALUMINIUM ALLOYS.—A. Luschenowsky. Feb. 2. (Germany, June 3, '33.) 3542.

PHENOLIC COMPOUNDS, production.—Sharpes Solvents Corporation. Feb. 7. (United States, March 24, '33.) 4046.

ANIMAL AMINO-ACIDIC SALT SYRUP, manufacturing.—W. W. Triggs and C. Wada. Feb. 3. 3633.

REMOVING BISMUTH from lead.—American Smelting and Refining Co. Feb. 10. 4508.

GLYCERINES from oils or fats, production.—L. B. Bleackley. Feb. 10. 4445.

VARNISHES, etc., production.—L. B. Bleackley. Feb. 10. 4446.

## Prices of Chemical Products

#### This Week's Market Conditions

BUSINESS has been on a moderate scale in most sections of the chemical market, with a good demand in the industrial section for acetone, formaldehyde, formic acid and oxalic acid. The arsenic market remains weak and uncertain, and the demand for barium compounds, sodium sulphide and most of the potassium salts has been limited. Crude carbolic acid prices have been reduced and the chief interest in the coal tar products market during the week has been shown in creosote oil and refined coal tar. There has only been a limited inquiry for pharmaceutical products and business in the essential oils section has been slow, although there has been an improvement in Bourbon geranium and Japanese peppermint. Prices remain as reported in THE CHEMICAL AGE last week (pages 150-151), with the exceptions noted below.

LONDON.—There is again no change to report. Prices still remain firm with a good steady demand generally. There is no change to report in the coal tar products market from last week, prices remaining unaltered.

MANCHESTER.—In some quarters here there is a feeling that the new Russian trade agreement will react favourably upon some branches of Lancashire trade, and thus indirectly benefit the consumption of Chemicals. Meanwhile, the demand on this market during the past week has not been particularly active so far as new commitments are concerned, and new bookings have again been limited largely to parcels for prompt or relatively near delivery dates. On the other hand, however, most traders agree that there is little of which to complain from the point of view of deliveries into consumption against contracts entered into a short time ago. The weakness of the metal has affected the price of sulphate of copper, but in most other respects values maintain a firm front, especially in the alkali products. The lighter coal-tar products seem to be fairly steady at the moment at the lower levels and a moderate trade is passing. Crude and refined tar, however, are easy in tendency, and the demand for pitch on this market during the past week has been made up of odds and ends.

SCOTLAND.—There is very little to report in the Scottish heavy chemical market, business being fairly quiet.

#### General Chemicals

LEAD ACETATE.—LONDON : White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND : White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER : White, £34 to £36; brown, £31. POTASH, CAUSTIC.—LONDON : £42. MANCHESTER : £38.

SULPHATE OF COPPER.—MANCHESTER : £15 15s. per ton f.o.b.

#### Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 8¾d. per lb.; crude, 60's, 2s. 1½d. to 2s. 2½d. per gal. MANCHESTER : Crystals, 9d. per lb.; crude, 2s. 5d. per gal. SCOTLAND : 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d., according to specification; refined, 1s. 11d. to 2s. 1d. LONDON : 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND : Pale, 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark, 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

#### Wood Distillation Products

ACETATE OF LIME.—Brown, £9 to £10. Grey, £16 to £17. Liquor, brown, 30° Tw., 7d. to 9d. per gal. MANCHESTER : Brown, £12; grey, £17.

#### Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £7 5s. per ton; export, nominal, £5 17s. 6d. f.o.b. U.K. ports in single bags.

## From Week to Week

**THE SALE OF RAILSIDE CHEMICAL WORKS**, Widnes, by Hillier, Parker, May and Rowden, has been postponed till Tuesday, February 27, at 11 a.m.

**MR. STEPHEN BARTON DAVIS, M.Sc., A.I.C.**, elder son of Mr. and Mrs. T. Barton Davis, Oakfield, Meols, was married to Margaret Chrystal, youngest daughter of Mr. and Mrs. James Blair, Aberdeen, at Meols, on February 17.

**SHIPPING AUTHORITIES** at Christobal (Panama Canal) are commenting on the fact that 93,604 tons of nitrate has passed through the Panama Canal during February. This is an unusually large amount to go through the Canal at such a period.

**SIR HENRY SUTCLIFFE SMITH**, the president of the British Colour Council, announced at the Council's annual dinner in London on February 21, that they had almost completed the compilation of the "dictionary of colours," which will be published in April, and will contain 220 shades, a dictionary of explanations of the colours mentioned, their foreign names, and the names by which they were previously known.

**THE INSTITUTE OF METALS** has issued particulars of its first educational tour. This will be made to Belgium from April 8 to 14, between which dates student members will have an opportunity of visiting six large metallurgical establishments and of seeing something of Brussels (including its University) and Bruges. The cost per head will be £6 10s. Students desirous of participating should communicate with the Secretary, Mr. G. Shaw Scott, M.Sc., 36 Victoria Street, London, S.W.1.

**DANIEL ADAMSON AND CO., LTD.**, have now taken over the goodwill, drawings and patterns of the boiler section of Calloways, Ltd.; including also the section of their business embodying mild steel riveted and welded tanks and other plating work. The modern trend in design and practice in steam raising plant, it is pointed out, is opening up new fields for higher efficiency and consequent increased economies, and as designers and manufacturers of all classes of shell boilers and steam turbine plant, Daniel Adamson and Co., Ltd., are in close touch with all recent developments.

A USEFUL PAMPHLET ENTITLED "Safeguards in the Laboratory," has been published at the price of 6d., by Canon Kirkland, The King's School, Ely. This pamphlet contains a number of very useful hints for first aid in the laboratory, which have been compiled by the Science Masters' Association and the Association of Women Science Teachers, and it should be very useful in the school laboratory. It should be noted, however, that the administration of an emetic, particularly salt solution, as stated, is not advisable in the case of mercuric chloride without first giving immediately white of egg.

**THE SENATE OF BOMBAY UNIVERSITY** have resolved to make the following appointments in the newly established Department of Technology: Reader in dyeing and printing, Reader in chemical engineering, Lecturer in experimental dyeing, Lecturer in industrial and tintorial chemistry, and Lecturer in fuel technology. The Senate has also decided to institute diplomas in soap making, paints and varnishes, dyeing, printing and finishing, leather tanning, and printing and lithography. The appointment of Dr. Forster as the Director of the Technological Department again came in for criticism at the hands of the Senate when the motion for supplies came in for discussion.

APPLICATION WAS MADE in the London Bankruptcy Court on February 16, for the discharge of Bryan Laing, who was adjudged bankrupt in October, 1932, being described as formerly of Coles Buntingford (Hertfordshire), formerly a company director. Mr. Bruce Park (Assistant Official Receiver) said Mr. Laing estimated his ranking liabilities at £129,510. The assets, which he valued at £10, had realised nothing. Mr. Laing had stated in evidence that after the war he was associated in experiments in the production of oil by a low-temperature distillation process. He attributed his failure to depreciation of his shareholdings and to his liability for calls due to Sensible Heat Distillation Company, Ltd., and to Leicestershire L. and N. Coal Distillation, Ltd. Discharge, said the Registrar, would be suspended for three years.

**MR. R. C. SKIPPER**, the oldest employee of the Vacuum Oil Co., who has just celebrated his 81st birthday, has received a presentation from the board of the company. The presentation, which consisted of a pocket wallet with an enclosure, was made by Mr. Wilson Cross, chairman, who congratulated Mr. Skipper on still being on active service. Mr. Skipper, who is employed in the tanners' department, completes 34 years' service with the Vacuum Oil Co. next month. He is a well-known personality in the leather trade. The fact that Mr. Skipper is still on the road at 81 is probably a record for age, but his thirty-five years of service is not a record for the Vacuum Oil Co., which is noted for the long service of its staff. There are twelve men in its employment who joined before Mr. Skipper; eight of them have from 35 to 39 years' service, and four have from 40 to 44 years' service.

**THE PAPER ON "LAMINATED SHEET"** scheduled to be read before the Institute of the Plastics Industry by Mr. E. R. R. Bray, at the Imperial Hotel, Temple Street, Birmingham, on March 23, has been brought forward to March 16.

**EXTENSIVE DAMAGE WAS CAUSED BY FIRE** at the works of the United Kingdom Paint and Varnish Co., Ltd., of Viaduct Street, Stockport, on February 20. The building in which varnish was made was destroyed, but the brigade prevented the fire reaching the paint department and the offices.

**THE BOUVERIE PLAYERS SOCIETY** (Benn Brothers, Ltd., Dramatic Section) presented "Interference" at the New Scale Theatre, London, on February 19, in aid of the John Benn Hostel. The play was produced and staged under the direction of Mr. Jack Wrench, of the advertisement department of THE CHEMICAL AGE.

**SIR FREDERICK GOWLAND HOPKINS**, Professor of Biochemistry at the University of Cambridge, has been elected an honorary academician of the Academy of Science at Leningrad. Professor Erwin Schrödinger, Professor of Physics at the University of Berlin, who is working at Cambridge, was also elected an honorary member of the Academy.

**PLANS FOR A MERGER** of the Anglo-Chilean and the Lautaro Nitrate concerns were being discussed in New York, on February 19, and will be submitted to creditors and bondholders in London within the next few weeks, states the "New York Journal of Commerce." It is expected that after the proposal is approved the companies will individually be recapitalised on a basis directly related to operations and property values and probable earnings. The merger will then follow.

**THE MYSORE GOVERNMENT PORCELAIN FACTORY**, which was started nearly two years ago, has recently been showing great progress. The factory was started primarily to manufacture insulators to meet the demand of the Mysore Government Electrical Department which consumed insulators to the value of over Rs.50,000 per year. It now manufactures fancy goods, and crockery of all kinds. The factory will now commence using electrical kilns in place of coal, as electrical power is found more economical, and a sum of about Rs.50,000 is proposed to be spent in installing an electrical kiln.

**MELLON INSTITUTE OF INDUSTRIAL RESEARCH** announces the foundation of an Industrial Fellowship by Toledo Precision Devices, Inc., an associate organisation of the Toledo Scale Co., of Toledo, Ohio. This Fellowship will investigate problems involved in food merchandising, and especially in the storage and display of food during distribution through wholesale and retail grocers. It is believed that studies of "food keepability" in the laboratory, and in co-operation with the distributing trade, will result in the acquisition of technical information leading to improved methods of food distribution through stores.

**THE ANNUAL DINNER** of the London Section of the British Association of Chemists will be held at the Palace Rooms, Palace Hotel, Bloomsbury Street, W.C.1, on Saturday, March 10. Tickets, 8s. 6d., may be obtained from the General Secretary, British Association of Chemists, "Empire House," 175 Piccadilly, London, W.1. The annual meeting of the Manchester Section will be held at the Engineers' Club on March 21, at 6.30 p.m., and will be followed by the section annual dinner. Tickets, 6s., are now available and should be applied for to Mr. A. Hill, 8 Strain Avenue, Hill Lane, Blackley, Manchester, 9.

**REPRESENTATIONS HAVE BEEN MADE** to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption of copper methyl arsenate and filic acid from Key Industry Duty under Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act. The ground of the representations is that the material is not made, and is not likely to be made, in any of the British Dominions in substantial quantities, having regard to the requirements of the United Kingdom. Communications on the subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than March 13.

**THE "POWER AND FUEL BULLETIN,"** issued monthly by the British National Committee of the World Power Conference, is now in the fourth year of publication. It aims at providing selective and up-to-date abstracts of publications, papers, articles, etc., on power and fuel, published in Great Britain, grouped under main and sub-headings. A special feature is made of preparing abstracts of papers read before Institutions from "advance papers," without waiting for their inclusion in transactions or proceedings. The abstracts are indexed in accordance with the universal decimal classification system. Similar bulletins are issued by the national committees in Germany, Italy, Japan, Poland and the Union of South Africa, and the use of this system makes it possible to amalgamate into a single index all the abstracts, irrespective of the source of language employed.

## Company News

**North Broken Hill, Ltd.**—A dividend of 7½ per cent. is announced in respect of the year to June 30, 1934.

**The International Paint and Compositions Co.**—A final ordinary dividend of 6 per cent., making 9 per cent., less tax, for the year 1933, is announced.

**Milton Proprietary Co.**—A dividend of 10 per cent. has been declared and a cash bonus of 3½ per cent. on the ordinary shares, making 18½ per cent. for the 15 months ended December 31, 1933.

**Bradford Dyers' Association.**—For the year 1933 there is a profit, after crediting surplus provision for income tax, of £231,880; debenture interest absorbs £58,150, depreciation £171,990, leaving to be carried forward £36,285.

**Fairy Dyes, Ltd.**—The report for the year ended November 30, 1933, shows a profit, including interest and fees, of £14,478, against £21,043 in 1932-32. It is proposed to pay 10 per cent. on the ordinary shares, and to carry to reserve fund £5,000, leaving £1,410 to be carried forward.

**Southall Bros. and Barclay.**—The report for the year 1933, shows a profit, after tax, fees, and staff funds of £80,708. A final dividend of 9d. per 5s. share is recommended, transferring to price reduction fund £50,000, leaving to be carried forward £17,754. The directors announce their intention to distribute one bonus ordinary share for every four now held.

**Celanese Corporation of America.**—The net income for the year 1933 is \$7,086,015, and the net profit has risen from \$891,865 to \$5,453,903. The first preferred stockholders received \$942,623, and all arrears were paid off during the year, while dividends paid to the second preferred stockholders totalled \$1,804,737. The payments on the latter stock are now only \$1 in arrear, allowing for the distribution to be made on March 2.

**Courtaulds, Ltd.**—For the year 1933, the profits, after crediting interest and dividends on investments, and after charging expenses, depreciation and taxation, were £2,552,050. To this is added the balance of £239,387 brought forward from 1932, making a total of £2,791,438. The directors have decided to carry £700,000 to general reserve and to recommend the payment of a final dividend on the ordinary shares of 4½ per cent., free of tax, making 6 per cent., free of tax, for the year. The balance carried forward is £151,438.

**Canadian Celanese.**—A net income for the year 1933 is reported of \$1,857,666, and the net profit stands at \$1,266,864 compared with \$301,191 and \$718,881 respectively in 1932. Dividends distributed to 7 per cent. cumulative participating preferred shareholders amounted to \$855,000—the regular 7 per cent. dividend for 1933 and 2½ per cent. on account of arrears, which now stand at \$26,25 per share. An amount of \$500,000, appropriated from surplus, has been set up as a reserve for amortisation of patents and processes, leaving the balance at credit of surplus account at \$1,628,176. A special reserve of \$150,000, previously appropriated from surplus to meet market depreciation of investments, remains intact.

**Borax Consolidated, Ltd.**—The balance of profit and loss for the year ended September 30, 1933, after providing for all management and administration expenses, is £209,423. The requirements for the debenture interest for the year and the interim dividend on the preference shares paid on May 1, 1933, amounted to £135,855, leaving, with the amount brought forward, a sum to be dealt with of £275,759. To buildings, plant, etc., depreciation reserve account there has been placed the sum of £40,000; and to the credit of the debenture stock redemption sinking fund the annual premium of £5,825. There remains to the credit of profit and loss account the sum of £229,934, out of which a final dividend on the preference shares was paid on November 1, 1933, leaving a balance of £207,934, which the directors propose to carry forward to the next account. The report states that the United States Potash Co., in which the Company has a large investment, has made very substantial profits during the past year and will, it is expected, pay a dividend during the current financial year.

## Books Received

### Official Publications

**The Investigation of Atmospheric Pollution. Report to March 31, 1933.** Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 100. 5s.

**Economic Conditions in The Republic of El Salvador, November, 1933.** By F. M. Shepherd. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 43. 1s. 9d.

**Report on the Work of the Chemical Department in the Financial Year, 1931-1932.** Chemical Department, Ministry of Finance, Egypt. Cairo: Government Press. Pp. 64. P.T.5.

## Forthcoming Events

- Feb. 27 and Mar. 1.**—University of London. Advanced lectures in Chemistry. I—The Many-Membered Carbon Rings. II—The Constitution of the Sesqui- and Diterpenes. Professor Dr. L. Ruzicka. 5.30 p.m. University College, Gower Street, London.
- Feb. 28.**—Royal Society of Arts. "The Canning Industry." T. N. Morris. 8 p.m. John Street, Adelphi, London.
- Feb. 28.**—Manchester Metallurgical Society. "Material questions in Steel Tube Manufacture." J. W. Jenkin. 7 p.m. Engineers' Club, Albert Square, Manchester.
- Mar. 1.**—Society of Chemical Industry (Bristol Section). Annual general meeting. "The X-Ray Interpretation of the Molecular Structure of Fibres." W. T. Astbury. 7.30 p.m. University, Woodland Road, Bristol.
- Mar. 1.**—Society of Dyers and Colourists (West Riding Section). "The Chemical Theory of Dyeing." Dr. J. B. Speakman.
- Mar. 1.**—Society of Chemical Industry (South Wales Section). "The Colloidal Conditioning of Boiler-Feed Water." 7 p.m. Technical College, Cardiff.
- Mar. 1.**—The Chemical Society. Ordinary scientific meeting. 8 p.m. Burlington House, Piccadilly, London.
- Mar. 1.**—Midland Metallurgical Societies. "Field Tests on Corrosion." J. C. Hudson. 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.
- Mar. 2.**—Society of Public Analysts. Annual general meeting. 3 p.m. Burlington House, Piccadilly, London.
- Mar. 2.**—Society of Chemical Industry (Manchester Section). Joint meeting with the Manchester Section of the Oil and Colour Chemists' Association and the Plastics Group of the S.C.I. "Cellulose Ethers." Dr. Traill. 7 p.m. 17 Albert Square, Manchester.
- Mar. 2.**—Society of Chemical Industry (Glasgow Section). Annual business meeting. 6.45 p.m. Exhibition of Industrial Films. 7.30 p.m. Royal Technical College, Glasgow.
- Mar. 2.**—Chemical Society. Bedson Lecture. "Elements, Old and New." Professor J. Kendall. 6.30 p.m. Chemistry Lecture Theatre, Armstrong College, Newcastle-on-Tyne.

## Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

**Finland.**—The Commercial Secretary to H.M. Legation at Helsingfors reports that a local firm of paint manufacturers desires to be placed in touch with United Kingdom manufacturers of benzol (90 per cent.) and naphtha solvent (benzol 160 deg.). (Ref. F.Y. 1970.)

**Finland.**—A firm in Helsingfors desires to obtain the representation of United Kingdom manufacturers of dry colours, chemical colours, earth colours, e.g., umbra, terra sienna, red ochre; zinc white, ceruse, lead minium; lacs and lac dyes; oil lacs, floor lacs, floor enamel, white enamel; chemical wood pulp lacs for furniture and linoleum. (Ref. No. 221.)

**Morocco.**—H.M. Consul-General at Rabat reports that the Public Security Service of the Moroccan Protectorate Government is calling for tenders to be presented in Morocco by March 21, 1934, for the supply of 25,000 kilograms of oil (olive or ground-nut), 20,000 kilograms of soap (hard) and 8,000 kilograms of "Cresyl" disinfectant. (Ref. B.Y. 7759.)

## New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade mark can be lodged up to February 24.

**Erasol.** 547,372. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. I. G. Farbenindustrie, Frankfurt-on-the-main, 20, Germany. January 1, 1934.

Opposition to the registration of the following trade marks can be lodged up to March 14, 1934.

**Lissolamine.** 544,699. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including dyes or dyestuffs. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester. September 21, 1933.

**Pyrobel.** 545,231. Class 1. Paints, enamels (in the nature of paints), lacquers, japans, varnishes, distempers and paint driers. Nobel Chemical Finishes, Ltd., Imperial Chemical House, Millbank, London, S.W.1. October 11, 1933.

